

RESEARCHES  
ON THE  
PATHOLOGY OF THE BRAIN.

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PART II.

ON APOPLEXY.

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# RESEARCHES ON THE PATHOLOGY OF THE BRAIN.

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## PART II.

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### ON APOPLEXY.

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THERE is not in medical science a subject involved in greater obscurity than the pathology of Apoplexy. A person, previously in perfect health, falls down suddenly, deprived of sense and motion, and dies after lying for some time in a state of stupor. On opening the head, we find a large coagulum of blood compressing the surface of the brain, or filling its ventricles, and the death of the patient is distinctly accounted for. Another is cut off with the very same symptoms, and we expect to find the same appearances, but nothing is found except serious effusion in no great quantity, in the ventricles, or sometimes only on the surface of the brain. A third is seized in the same manner, and dies after lying a considerable time in a state of coma, from which nothing can rouse him for an instant, and on the most careful examination, we cannot detect in his head the smallest deviation from the healthy structure. The causes of these remarkable varieties present a subject of the deepest

interest, both to the pathologist and the practical physician, but at the same time a subject of extreme difficulty, and requiring to be investigated in the most cautious manner. In attempting a very imperfect outline of it, I shall first give a general view of the varieties of symptoms which occur in Apoplexy, and then endeavour to investigate the morbid conditions connected with these varieties.

The apoplectic attack is generally preceded by symptoms indicating deranged circulation in the brain. The most remarkable of these are the following :—Headach, giddiness, sense of weight and fulness in the head, violent pulsation of the arteries, tinnitus aurium, and confused noises, sometimes compared to a number of people talking at once: these symptoms are often accompanied by epistaxis, which may give a partial and temporary relief; by loss of recollection, and incoherent talking resembling intoxication; affections of the sight, as double vision and temporary blindness; drowsiness and lethargic tendency; indistinct articulation, and other paralytic affections, sometimes confined to one limb or part of a limb, sometimes affecting the eyelids, and producing there either inability to open the eye, or inability to shut it, and frequently the muscles of the face, where it gives rise to twisting of the mouth. These symptoms, together with others of a similar kind, mark the tendency to the apoplectic state. The attack itself occurs under various forms, which I think may be referred to three.

I. In the first form, the patient falls down suddenly, deprived of sense and motion, and lies like a person in a deep sleep; his face generally flushed, his breathing stertorous, his pulse full, and not frequent, sometimes below the natural standard; in some cases convulsions occur. In this state of profound stupor, the patient may die after various intervals, from a few minutes to several days, or he may recover perfectly without any bad consequence of the attack remaining, or he may recover with paralysis of one side. This paralysis may disappear in a few days, or it may subside very gradually, or it may be permanent; other functions, as the speech, may be affected in the same manner; and sometimes recovery from the apoplectic state is accompanied by loss of sight.

II. The second form of the disease begins with a sudden attack of violent pain in the head; the patient becomes pale, sick, and faint, generally vomits, and frequently, though not always, falls down in a state resembling syncope, the face very pale, the pulse very small. This is sometimes accompanied by slight convulsion. In other cases he does not fall down, the sudden attack of pain being only accompanied by slight and transient

loss of recollection. In both cases he recovers in a few minutes,—is quite sensible and able to walk,—continues to complain of intense headache; after a considerable time, perhaps some hours, becomes oppressed, forgetful, and incoherent, and thus gradually sinks into coma, from which he never recovers. In some cases paralysis of one side occurs, but in others, and I think the greater proportion of this class, there is no paralysis.

III. In the third form, the patient is suddenly deprived of the power of one side of the body, and of speech, without stupor; or, if the first attack is accompanied by a degree of stupor, this soon goes off; he appears sensible of his situation, and endeavours to express his feelings by signs. In the farther progress of this form of the disease, great variety occurs; in some cases, it passes gradually into apoplexy, perhaps after a few hours; in others, under the proper treatment, the patient recovers perfectly in a few days. In many cases, the recovery is gradual, and it is only at the end of several weeks or months that the complaint is removed. In another variety, the patient recovers so far as to be able to speak indistinctly, and to walk, dragging his leg by the most painful effort, and after this makes no further improvement. He may continue in this state for years, and die of some other disease, or he may be cut off by a fresh attack. In a fifth variety, the patient neither recovers nor passes into apoplexy; he is confined to bed, speechless and paralytic, but in possession of his other faculties, and dies gradually exhausted, without apoplexy, several weeks or months after the attack.

These three forms of the disease may frequently pass into one another by numerous modifications; but they are often met with as I have here described them, forming affections which differ remarkably from each other. This will appear from the following examples.

### SECT. I.—CASES OF THE FIRST CLASS.

CASE I.—Mrs S. a midwife, aged about 70, of a full habit and short stature,—while sitting by the bed of a lady whom she was attending, suddenly exclaimed, “I am gone!” and instantly fell down in a state of perfect coma, with some vomiting. She lay comatose, without any change in the symptoms, for forty hours, and then died. On dissection a coagulum of blood, the size of a pigeon’s egg, was found in the right lobe of the cerebellum. There was no other morbid appearance.

CASE II.—Mr W. aged 80, active, vigorous, temperate, and of rather a spare habit, about the 9th of June 1813, began to be affected with loss of recollection, indistinctness of speech, and flushing of

the face. He appeared to have at times a weakness of the right arm, being observed to drop things from that hand, but he did not admit that he felt any weakness of it. He complained neither of headache nor giddiness, but said he was weak, and did not feel himself right; the pulse was natural, and of good strength. After a bleeding from the arm, purgatives, and a proper regulation of diet, he seemed to be much improved. He had greatly recovered his recollection; had lost the flushing of the face; and his speech was much more distinct. He walked out regularly, and his step was firm and vigorous. Soon after, however, he began to have a recurrence of confusion of thought, particularly on the 27th, when, in endeavouring to write a letter, he was obliged to relinquish the attempt. He complained that he could not make sense of it, or spell the words; the writing was scarcely legible, and the lines were very crooked. On the 28th he seemed much better. On the following night he slept ill; got up about four o'clock in the morning; said he felt restless and uneasy; walked about his room for some time, and then went to bed again. Having soon after become quiet, his family did not disturb him till between eight and nine o'clock, when he was found in a state of perfect apoplexy. His pulse was 80, and full; his countenance natural. He moved occasionally his right arm; in other respects was in a state of complete insensibility, and was incapable of swallowing. He was then bled to about  $\frac{3}{4}$  xxx., after which he became extremely pale. For a short time his pulse could not be felt, and it continued for a considerable time very weak, but without the smallest abatement of the perfect coma. Purgatives, glysters, topical-bleeding, blistering, &c. were then employed without effect. In this state of perfect apoplectic coma he lay for seven days, during which time the only changes observed in the symptoms were, that once or twice he opened his eyes slightly for a few seconds; he moved his right arm and leg freely, but not the left; he frequently scratched a herpetic eruption on his thigh, and several times moved his night-cap. The pupil was natural, and contracted when a candle was brought near it. He passed his urine in bed. He never swallowed a drop of any thing. His pulse at first varied from 80 to 100; but afterwards rose to 120. A few days before his death a glandular swelling appeared on his neck, from which he evidently felt pain, as he drew away his head when it was touched. In this state of perfect apoplexy he died on the 5th of February. *Dissection*.—A good deal of fluid escaped while the cranium was opened; there was considerable effusion under the arachnoid coat, and in the ventricles; the quantity collected was probably from three to four ounces. No other morbid appearance could be detected in any part of the cranium.

**CASE III.**—Mr R. aged about 70, rather florid in his countenance, but infirm in his limbs, had suffered repeated attacks of loss of recollection, which were said by his family to resemble fainting-fits. At the commencement of the illness of which he died, he fell down,

suddenly deprived of sense and motion. After some time he recovered from this state of insensibility, but his speech was very inarticulate. He had lost the power of his limbs, and his right eye was distorted outwards. He was then confined to bed; at times incoherent, at other times tolerably distinct; but always much oppressed, approaching to coma: his speech very inarticulate, and his right eye distorted as at first; his pulse generally about 100. All the usual remedies were employed without benefit. His strength sunk gradually, without any particular change of the symptoms, and he died exhausted, without perfect coma, at the end of five weeks. On *dissection* the ventricles of the brain were found distended with colourless fluid, and there was a considerable quantity under the arachnoid membrane. There was no other morbid appearance.

**CASE IV.**—J. B. a printer, aged 41, of a very full habit, had been for some time affected with severe cough and dyspnoea, to which he had long been liable, and with anasarca of the legs, when he became one day suddenly incoherent, and soon after comatose. The coma was of that kind out of which he could be roused so as to answer questions, but they were answered slowly and heavily, and often incoherently. His breathing was much oppressed; his face livid and turgid; his pulse frequent, and rather weak. Blood-letting and other remedies were employed without benefit. He died on the third day from the appearance of these symptoms. On *dissection* much fluid was found in the ventricles of the brain; the lungs were much loaded with blood, and there was considerable serous effusion in the cavity of the pleura. In the heart the foramen ovale was open, the size of a goose-quill.

**CASE V.**—Mrs G. aged about 50, of a spare habit, had been liable for many years to severe attacks of dyspnoea and cough, which were generally relieved by opiates and blistering. On the 20th December 1816, she was seized with one of these attacks in the ordinary form. On the 22d was better and able to go about her house, though her breathing was still considerably oppressed. On the morning of the 23d she complained of headach, and wished not to be disturbed. Soon after she appeared to her family to fall asleep, but it was perfect coma, from which nothing could rouse her. I saw her for the first time at 4 P. M.; she was then in perfect coma; her lips livid; her breathing quick and oppressed; her pulse frequent and feeble. She died in less than an hour. *Dissection*.—On the surface of the brain, the veins were remarkably turgid, and the substance, when cut into, exhibited marks of increased vascularity. There was no effusion; the lungs were remarkably distended, and did not collapse in the least when the thorax was opened. A good deal of thin mucus flowed out when they were cut into, but their structure was tolerably healthy. There was no effusion in the pleura. The heart and the viscera of the abdomen were sound.

**CASE VI.**—A gentleman, aged about 24, had been observed for some days to be dull and drowsy, and he had frequently complained of his head. Not appearing at his usual time in the morning, his friends went into his room and found him lying across his bed, half dressed, in a state of perfect apoplexy. The attack was evidently recent, and it was supposed that he had been seized while in washing he had stooped over his basin. His face was rather livid; his breathing stertorous; his pulse slow and of good strength. Blood-letting, purgatives, blistering, and the other usual remedies were employed, under the superintendence of two medical men of the first eminence. Through the day there was no change in the symptoms; in the course of the night he recovered considerably so as to know those about him, and answer questions sensibly; but after a short time he relapsed into coma, and died early on the following day, little more than 24 hours after the attack. I was present at the examination of his body, and on the most careful examination no morbid appearance could be detected in the brain, except slight turgescence of vessels on the surface. All the other viscera were in the most healthy state.

**CASE VII.**—Mr S. aged 80, of a full habit and a short neck, stout and active for his years, and very temperate, had enjoyed good health, except that, a few weeks before his death, he became one day suddenly incoherent. This was removed by purging, and did not return. In the evening of 12th August 1816, he went to bed in his usual health, and next morning was found dead in bed, his body scarcely cold, his face and neck of a purple colour, and very turgid. I examined his body, along with Mr Whyte, whose patient he had been, in the confident expectation of finding a well marked case of apoplexy. On the most minute examination no vestige of disease could be detected in the head. There was a tumour in the liver which could not be supposed to have any connection with the death of the patient. The only other morbid appearance that we could detect was in the heart, all the cavities of which were perfectly empty, as if they had been carefully cleaned with a sponge from every particle of blood. The vena cava and the aorta were also empty.

**CASE VIII.**—A lady, aged 45, for three months before her death, had been affected with the following symptoms: nausea, and a peculiar uneasy feeling about the stomach, particularly after meals—a feeling of distention of the abdomen—costiveness of the bowels, and anasarca of the feet and legs. Her appetite was tolerable; and the pulse natural, but from being remarkably stout and active, she became feeble, sallow, listless, and inactive.

A great variety of practice was employed for three months, with very little benefit; the dropsical symptoms increased gradually; the anasarca extended farther and farther; there came to be fluctuation in the abdomen, and a strong suspicion of effusion in the thorax; the pulse continued natural in frequency, and of good strength. On the evening of the 18th May 1816, she was observed to talk hurriedly, and a

little incoherently ; on the morning of the 19th, she was in a state of stupor, from which at first she could be partially roused ; but soon after mid-day it increased to perfect coma. She then lay in an apoplectic state, with stertorous breathing and much moaning ; the face pale ; the pulse 72, soft, but of good strength, and died on the morning of the 20th. The catamenia had been regular, except at the last period, which should have taken place about the 12th of May. On dissection no disease could be detected in the head after the most careful examination. There was very considerable effusion, both in the thorax and abdomen. In the heart there was a slight cartilaginous hardness about the root of the tricuspid valves. No other morbid appearance could be detected in any of the viscera.

**CASE IX.**—A young lady, aged 17,\* whose catamenia were not regular, after complaining of drowsiness, fell suddenly into profound coma, with dilated and insensible pupil, and frequent convulsions. She died on the third day. On the most careful examination, no morbid appearance could be detected in the brain, or in any other organ.

**CASE X.**—An old man, aged 70, infirm, and of a spare habit, after being observed dull and stupid for a day or two, lost his recollection on the 10th April 1815 ; walked very unsteadily, and without knowing whither he was going. Being put to bed, he insisted upon being taken out of it again, and could not be made to comprehend that he was ill. After some time he got up, staggered a few steps, and fell down on the floor in a state of perfect apoplexy. In this state I saw him about half an hour after the attack. His pulse was of good strength, and a little frequent. Being bled to  $\frac{3}{4}$  xxv. he became sensible ; took purgative medicine ; and his head was shaved and blistered. After three hours, he relapsed into coma. He was then bled again to  $\frac{3}{4}$  xvi. which he bore well. This bleeding produced no immediate effect ; but the purgative having soon after begun to operate, he was gradually relieved ; next day was quite sensible ; and in a few days recovered his usual health. There was no paralytic symptom in this case.

**CASE XI.**—Mr M. aged about 70, infirm, emaciated, and very asthmatic, while sitting at his desk on Wednesday 19th November 1817, without any warning, fell on the floor speechless, comatose, and violently convulsed. I saw him about an hour after the attack ; he was still in perfect coma, and the convulsions recurred at short intervals ; they affected chiefly his arms and his face ; his face was rather pale ; his pulse of good strength and a little frequent.

He was bled to  $\frac{3}{4}$  xx. ; cold applications were ordered to his head ;

\* Transactions of the College of Physicians of London, Vol. V.

a purgative of calomel and jalap, and a purgative injection.

The convulsions continued to recur with much severity for some time; afterwards they became gradually less frequent and less severe; and at last ceased about three hours after the attack. The purgative having operated soon after this, he recovered his recollection. Next day he complained of headache and took more purgative medicine. After a few days more he was in his usual health.

*W<sup>m</sup> Dundas*

**CASE XII.**—A lady, aged 82, had an apoplectic attack in 1814. On Sunday 8th March 1818, after complaining of headache in the morning, she lost her recollection in church, talked incoherently, and was brought home with difficulty, being unable to stand, incoherent and partially comatose. Being put to bed, she was seized with violent convulsion, which affected chiefly her face and the left side of her body, and her head was violently drawn to the left side. The paroxysms of convulsion were of short duration, but they recurred frequently at uncertain intervals. In the intervals she was in perfect coma, and the left side appeared to be paralytic; the pulse was of good strength, and a little frequent. She was bled to  $\frac{3}{4}$ xx.; cold was applied to the head; and purgative medicine was given as soon as she could swallow.

The convulsions continued to recur for four hours; they then ceased after her bowels had been freely moved, but left her in a state of coma.

9th.—Much coma; pulse 112; purgative medicine repeated.

10th.—Coma much diminished; she was restless, and at times unmanageable; no paralysis; pulse as before; slight appearance of convulsion.

Small doses of tartate of antimony were given with considerable effect in diminishing the restlessness.

11th.—Unmanageable restlessness continued; pulse 110; purgative medicine repeated, and small opiates.

12th.—Considerably improved; began to know her friends; pulse coming down.

In a few days more she recovered her usual health.

## SECT. II.—CASES OF THE SECOND CLASS

**CASE XIII.**—Mrs S. aged about 70, healthy and active, had complained for a day or two of headache, but without being confined, or her health otherwise affected, till the evening of 7th August 1816, when she suddenly screamed out, from violent headache, vomited, and fell down in a state resembling syncope; her face was extremely pale; her pulse scarcely to be felt; and there was some slight appearance of convulsion. She recovered in a few minutes, and went to bed. Through the night she was restless, vomited repeatedly, and three or four times fell into a kind of fainting-fit of a few minutes duration. In some of these she was reported to have made a gurgling noise in

her throat, and to have shewn some convulsive motions of her arms. In the intervals she was sensible, and complained of her head. About eight o'clock in the morning of the 8th, she sunk into coma. I saw her for the first time at ten ; she was then completely insensible ; breathing stertorous ; face rather pale ; pupil contracted ; pulse of good strength and a little frequent. Repeated blood-letting, purgative injections, &c. were employed, and in the evening she had so far recovered, that when raised up in bed she took into her hand a glass containing purgative medicine, and drank it. She appeared to attempt to speak, but could not. Soon after she relapsed into coma. Pulse at night 112 ; there was no paralysis.

9th.—Perfect coma. Died at 4 P. M.

*Dissection.*—In the anterior lobe of the right hemisphere of the brain there was a cavity containing a mass of coagulated blood, the size of a small hen's egg. From this cavity the blood had burst a passage through the substance of the brain downwards ; had spread in all directions under the base of the brain, and upwards, on both sides, under the dura mater, so that portions of it were found on the upper surface, on both sides of the falx. The substance of the brain surrounding the cavity just mentioned, was soft and much broken down. The ventricles were empty, and all the blood-vessels appeared remarkably empty.

*andish*

CASE XIV.—Mr C, aged about 46, of short stature, full flabby habit, and sallow complexion, a literary man, and very sedentary, while speaking in a public meeting, on 28th April 1807, was seized, with an uneasy sensation in his head, “as if his head would have burst, or as if the brain had been too big for the skull.” This feeling soon went off, and he continued his speech. When he had done he left the room, and felt himself extremely unwell ; he had cold shivering, nausea, and repeated vomiting ; complained of headache, and faintness ; his face was pale, and his pulse feeble. After some time he was able to walk home, where I saw him at 9 P. M., an hour or rather more after the attack. He then complained of violent pain in the right side of his head ; it came on in paroxysms, and in the intervals he was much easier ; he had nausea, and repeated vomiting ; he felt cold and faint ; his face was pale and sallow ; his pulse weak, and rather frequent ; he was quite sensible, but much oppressed, and answered questions very slowly.

He was bled from the arm, and the pulse improving under the bleeding, it was continued to about  $\frac{3}{4}$  XXX. but without relief. He became gradually more and more oppressed, and by 11 P. M. had sunk into coma, with stertorous breathing, and complete insensibility. In this state he continued till six o'clock in the following morning, when he died. More blood had been taken from the temporal artery, and the other usual remedies employed, without the smallest benefit. During the last six hours of his life the pulse varied considerably, being at times slow and oppressed, at other times frequent and full, and the transitions from the one state to the other

were very sudden; a short time before death it was strong and frequent: the pupil of the eye had retained the natural appearance, and no paralytic symptom was observed at any period of the disease.

*Dissection.*—A large quantity of coagulated blood was found spread over the surface of the brain, under the duramater, in all directions, chiefly in the right side. The origin of it was evidently from the substance of the right hemisphere, from which it had burst outwards by a large ragged opening. This opening communicated with a cavity in the substance of the hemisphere, which also was full of coagulated blood. Large coagula were found under the base of the brain, around the cerebellum, and about the upper part of the spinal cord. In the ventricles there was about  $\frac{3}{4}$  i. of serous fluid.

**CASE XV.**—J. G. a hatter, aged 32, of a very full habit, while sitting by the fire in the evening of the 3d September 1804, was suddenly seized with violent headache, followed by vomiting. After a few minutes he began to talk incoherently, and soon after fell down in a state of insensibility, accompanied by slight convulsion. His face was extremely pale, his body cold, and the pulse scarcely to be felt. From this state, resembling syncope, he passed gradually into the ordinary apoplectic appearances, and three hours after the attack his breathing was stertorous, the body of natural heat, the pulse 72, and of good strength; the face was still pale, he had frequent vomiting, and was incapable of swallowing, and there had been no diminution of the coma. He now lay in a state of profound coma, and died 29 hours after the attack, without any change in the symptoms, except that, during the last 12 hours, the pulse varied from 100 to 112. Large blood-letting, and the other usual remedies, had been employed without the least effect. On *dissection*, all the ventricles were found distended with coagulated blood, which appeared to have burst into them from an irregular opening in the substance of the brain.

**CASE XVI.**—Mr H. a healthy young man, aged 18, after using rather violent exercise in the forenoon, had returned home before dinner, and was sitting before the fire, when, without any warning, he started up, pushed his chair backwards with violence, exclaimed "Oh my head," and instantly fell on the floor insensible, and slightly convulsed. I saw him within 10 or 15 minutes after the attack. By that time he had recovered his recollection, was sitting in a chair, and was quite distinct. His face was extremely pale, and his whole body cold and shivering; he complained of severe headache, and his pulse was weak, and rather frequent. Blood-letting was immediately employed, his pulse improving under it, and was repeated after a few hours, with the addition of blistering, purgatives, and other usual remedies. The coldness and paleness went off after some time, and he then complained only of severe headache, with a feeling of stiffness of his neck, and a pain extending down the cervical vertebrae; his

pulse was rather frequent, and of good strength. He continued in this state for two days, the pain varying in degree, and frequently he complained most of his neck ; his pulse was frequent, 120 or more, and of good strength ; the other functions were natural ; he was quite distinct ; had the use of all his limbs, and could get out of bed with little assistance when necessary, and sit up a considerable time. On the third day he began to be more oppressed, and a little confused and forgetful ; the other symptoms as before. On the 4th he sunk very gradually into coma, and died on the 5th. His pulse had continued from 120 to 140 ; there had been no paralytic symptom. On the 5th day there was repeated convulsion. Repeated blood-letting, purging, &c. had been employed without benefit.

*Dissection.*—All the ventricles of the brain were completely filled by coagulated blood. On the left side there was a laceration of the substance of the brain, of no great extent. It communicated with the left ventricle, and was also filled by the coagulum. There was no other morbid appearance.

**CASE XVII.**—Mrs S. aged 40, of a spare habit, 15th May 1811, at two o'clock P. M. was suddenly seized with headache, accompanied by vomiting and diarrhoea, and at the same time began to talk incoherently. She continued to talk incoherently for two hours, and then sunk into coma. I saw her at five ; she was then in a state of perfect coma ; the face pale ; the skin rather cold ; the breathing soft and natural ; the pulse 65, soft and rather weak. During the afternoon she had frequent vomiting, and repeated diarrhoea. No other change took place in the symptoms. A full bleeding was employed, and a blister to the head ; she was incapable of swallowing.

16th, 17th, and 18th.—She continued in a state of perfect coma ; never opened her eyes, nor shewed the least sensibility, except that she drew away her arm with violence when she was bled, frequently moved her limbs, those of both sides equally, and occasionally turned in bed. The pupil contracted a little when a candle was brought near it, the face was sometimes a little flushed, but generally pale. The pulse was from 70 to 80, and of good strength. No return of the vomiting or diarrhoea after the 15th. Bleedings both general and topical were employed, and purgatives.

On the evening of the 18th, she came out of the coma rather suddenly, like a person awaking from sleep, looked around her, put out her tongue when desired, and took what was offered her ; she also talked a little, but incoherently.

19th, 20th.—Much incoherent talking ; appeared at times to understand what was said to her, but could give no account of her feelings, only said she was “ very bad ; ” pulse from 70 to 80.

21st, 22d.—Incessant talking and delirium ; at times unmanageable, and attempting to get out of bed ; at these times the face was flushed,

at other times pale ; pulse varying from 90 to 120, weak and irregular ; appeared to be blind, but had the perfect use of all her limbs.

23d.—Highly delirious and maniacal.

24th, 25th.—Became calmer and manageable ; at times very weak. Pulse small and feeble ; skin cold, with a clammy sweat ; appeared at times to see and to know those about her.

26th.—Relapsed into coma ; lay with her eyelids half shut ; eyes distorted outwards. Pulse from 80 to 100, and rather weak ; face pale ; incapable of swallowing.

27th, 28th.—Perfect coma ; pulse about 90.

29th.—Died in the afternoon.

*Dissection.*—All the ventricles of the brain were full of a dark coloured fluid, like coffee. In the substance of the right hemisphere, there was a cavity containing a coagulum of blood as large as a hen's egg. This cavity communicated with the right ventricle, and the substance of the brain immediately surrounding it was soft, broken down, and nearly purulent. In the left hemisphere, at its upper and posterior part, there was a cavity the size of a large walnut. It contained a dark coloured matter, which appeared to be coagulated blood, but considerably changed in its appearance, being firmer in its texture than recent blood, and of a brownish colour, mixed with portions of a lighter colour, which appeared to be diseased cerebral substance. The substance of the brain surrounding this cavity was very soft, and broken down.

CASE XVIII.—Miss B. aged 56, enjoying good health, except occasional disorders of the stomach, on Tuesday, 30th July 1816, walked out in perfect health ; had gone but a very short distance, when she was seized with violent pain in the head, and giddiness ; soon after she lost her recollection, and fell down. She very soon recovered her recollection, and was carried home, being unable to stand. She was then seen by Mr Whyte, who found her pale and faint ; the pulse 70, and weak. She was a little incoherent, complained of severe headache, and had repeated vomiting. The vomiting recurred frequently for two days, and then subsided. The severe headache continued a week. During this period, she was generally confined to bed, but was sometimes able to sit up for a short time. Her face was pale ; her pulse from 70 to 76, and rather weak. She had some appetite, but bad sleep. She had no paralytic symptom, and made no complaint but of the constant pain of her head, which was always referred to the back of the head. At the end of the week, this pain became much less severe. She then complained chiefly of pain in the back and limbs, and some dysuria ; her pulse was as formerly, and her mind entire. In this manner she passed another week, still confined to bed, but towards the end of the week she appeared to be much better. On Tuesday 13th August, exactly a fortnight from the attack, she was suddenly seized with violent pain in the head, chiefly referred to the back part of it. In less than an hour she be-

came comatose, and in three hours more died. The face had still been pale, and the pulse natural.

I did not see this patient during her life, but was present at the examination of the body. In the substance of the anterior lobe of the right hemisphere of the brain, there was a cavity filled by a coagulum of blood the size of a hen's egg. From this cavity a lacerated opening led into the right ventricle, and all the ventricles were completely filled by coagulated blood. A thin stratum of blood was also found under the base of the brain. This blood seemed to have escaped from the ventricles by forcing a passage under the posterior pillars of the fornix. Around the cavity in the right hemisphere, the substance of the brain was broken down, soft and pulpy, almost purulent. Both kidneys were unusually vascular. About the right kidney there was a remarkable turgescence of veins, and an appearance of extravasated blood in the cellular membrane behind it.

### SECT. III.—CASES OF THE THIRD CLASS.

CASE XIX.—D. A. aged 58, a very stout man, of a florid complexion, formerly a serjeant, on the 7th March 1817, about nine o'clock in the morning, without any previous complaint, was observed to have lost his speech. I saw him about half-past ten, and found him walking about his room. He had the full use of all his limbs, understood all that was said of him, and answered by signs, but could not articulate a word; could put out his tongue freely; did not admit that he felt any uneasiness in his head; pulse natural, and of good strength; face flushed. Repeated bleeding, purgatives, &c. were employed, without producing any change in the symptoms.

8th.—Was found in the morning to be affected with perfect hemiplegia of the right side; tongue when put out was turned to the right side; no other change; still quite intelligent; no attempt at speech.

He now lay for about a month without any change in the symptoms; slept well in the night; in the day was quite intelligent, and answered by signs. For some time, his tongue, when put out, was turned to the right side, but afterwards it became straight. He took his food, and appeared to have no pain; his pulse was natural. The right side continued completely paralytic, and he made no attempt at speech. About the 10th of May, he began to have violent pain in the paralytic limbs, and could not bear them to be moved in the gentlest way without screaming. Nothing was to be seen about them that could account for the pain. For about a fortnight, he now suffered constant pain; his strength sunk; he lost his appetite. He then had some vomiting, but not urgent; his pulse became feeble, and his features collapsed, and he died in the end of May, of gradual sinking, without coma. There had been no recovery of speech, or of the motion of the right side.

*Dissection.*—On opening the head, there appeared a remarkable depression on the upper surface of the left hemisphere of the brain,

about two inches in length, and somewhat less in breadth ; the dura mater sinking into it, to the depth of about half an inch. On removing the dura mater, the substance of the brain at this place was to a great extent broken down, soft and pulpy ; and this appearance extended along nearly the whole upper part of the left hemisphere. Tracing this pulpy mass backwards, it was found to be terminated by a small coagulum of blood, not larger than a small bean. This was situated near the posterior part of the hemisphere, about two inches from the posterior surface, one and a-half from the outer surface, and nearly on a level with the horizontal part of the lateral ventricle. The coagulum was soft, like recent blood. There was no effusion in the ventricles.

*most*  
**CASE XX.**—Mr F., aged 35, while standing in the street, conversing with another gentleman, suddenly lost his speech ; he recovered it after a few minutes, walked home, and made no particular complaint. In the evening of the same day, he suddenly fell from his chair, deprived of speech, and paralytic on the right side, but without coma ; being sensible of what was said to him, and answering by signs. He was then confined to bed for several weeks, without any change in the symptoms. At the end of three months, he had recovered so far the motion of his leg, as to be able to walk a little, dragging forward the leg by a motion of the whole right side of his body. He afterwards improved considerably in bodily strength, so that he could walk several miles, but his right thigh and leg continued to be dragged forward by the same kind of effort, without farther improvement. He never recovered any degree of motion of his arm or hand ; he could not even move his fingers ; his speech was very inarticulate, and his countenance was expressive of great imbecility of mind. In this state he continued without relapse, and without farther improvement, for fifteen years, when he died at the age of fifty. For a month before his death, he had been declining in strength. I saw him about five days before he died, and found him in a state considerably resembling typhus ; his pulse frequent, and weak ; his tongue very foul, and dry in the middle. He made no complaint. He was not then in bed, but was confined to it next day, and died in four days more, of rapid sinking, without coma.

**Dissection.**—The membranes adhered firmly to each other, and to the brain, at a spot the size of a shilling, on the upper part of the right hemisphere. There was a large quantity of fluid under the arachnoid membrane, and a considerable quantity in the ventricles. Near the posterior part of the longitudinal sinus, a small part of the sinus appeared to be thickened in its coats, and the inner surface of this part was dark-coloured, and slightly fungous. The cauda equina was of a remarkably dark colour, as if it had been soaked in venous blood, but without any change in the structure. No other morbid appearance could be detected, on the most careful examination, in any part of the brain or spinal cord.

**CASE XXI.**—A man aged about 50, lean and sallow, on Monday 11th May 1818, fell down in the street speechless and paralytic in the right side. When seen several hours after the attack, he was lying with his eyes open, as if he took notice of objects, but did not seem to comprehend what was said to him. He made no attempt to speak. It was the third attack of the same kind, but more severe than any of the preceding. One full bleeding was employed, after which his pulse continued so weak, that there was no encouragement to repeat it. Purgatives were then used, with repeated blistering to the head and neck. He continued without any improvement for ten days; after this he gradually recovered; at the end of three weeks he was able to walk, and is now in perfect health. His mind is entire, and he attends to his business, which is that of a collector of taxes, but has never recovered his speech in the smallest degree.

**CASE XXII.**—A man aged 35,\* of a full habit, and intemperate, was suddenly seized with loss of speech, and perfect palsy of the right side. Being bled to  $\frac{3}{2}$ xxi. he spoke more distinctly. The bleeding was repeated after two hours, and he took strong purgatives. Next day the motion of the right side was considerably improved, but, becoming more paralytic towards the evening, he was bled again to  $\frac{3}{2}$ xviii. Purging was repeated, with blistering on the neck. On the third day, he was again better in the morning, and rather worse at night, and was again bled to  $\frac{3}{2}$ xiv. By purging and spare diet, he then mended progressively, and in a few days was free from any paralytic symptom.

**CASE XXIII.**—An old and very poor woman, aged about 70, thin, pale, and withered, having gone out to bring water from one of the public wells, on the morning of the 2d July 1818, fell down in the street speechless, and completely paralytic on the right side. Nothing was done till about 2 P. M. when I saw her. She was oppressed, but not comatose; completely speechless and paralytic; her pulse of good strength, and about 96. She was bled to  $\frac{3}{2}$ xv. Purgative medicine was ordered, and cold applications to the head; on the 3d she was considerably improved both in speech and motion, but having become rather worse at night, the bleeding was repeated, and purgative medicine continued. From this time she improved gradually; at the end of a week she was able to walk with a little assistance, and speak pretty distinctly; and by the end of another week she had entirely recovered her former health.

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\* *Thomton's Annals of Philosophy*, August 1816.

## APPENDIX TO THE CASES.

*Extensive Effusion in the Cranium, without Coma.*

CASE XXIV.—A gentleman, aged about 70,\* a man of talent and of genius, had been valetudinary and hypochondriacal for upwards of 30 years, having been affected with a variety of uneasy sensations of the stomach, indigestion, and sense of tightness across the lower part of the belly, and occasional attacks of dysuria. In the beginning of 1817, he became feeble, listless, and unable for any exertion either of body or mind. In the day he was drowsy, but his nights were restless and feverish. His whole attention was now directed to his health, and he used a variety of remedies without benefit. His countenance at this time was pale and sallow; his pulse from 76 to 84; his tongue slightly loaded; his bowels generally constipated, but easily moved by medicine, the operation of which was sometimes followed by diarrhoea. Nothing unusual could be detected on examining the abdomen, and the urethra, the prostate gland, and the rectum, in which disease had been suspected, were all found to be healthy. A variety of remedies were employed without benefit. They consisted chiefly of cupping, purgatives, opiates, shower-bath, and warm bath; opiates never failed to produce strangury. He passed the summer without improvement. In the winter his complaints were aggravated. They consisted as formerly of heaviness, feebleness, and want of sleep, to which were now added a troublesome cough, and constant pain at the lower part of the abdomen, with strangury; his appetite failed; his pulse increased in frequency; and he became daily more and more feeble and emaciated. In the beginning of March 1818, he was confined to bed; his strength sunk gradually, and he died on the 14th, having retained his memory and all his faculties entire till within a few hours of his death. He had never complained of headache or giddiness, and never had any paralytic or convulsive affection. His pulse had been uniformly above the natural standard, and regular, except on one or two occasions when it had been observed to intermit slightly.

*Dissection.*—A copious effusion of transparent fluid was found over the whole surface of the brain under the arachnoid membrane, which in various places, particularly at the posterior part, raised that membrane in the form of small bladders, and separated some of the convolutions from each other, so as to form depressions on the surface of the brain. The ventricles were also filled with fluid, but not much enlarged. The brain was in other respects sound. The viscera of the abdomen were in a natural state. The bladder was contracted and thickened, but there appeared to be no disease of the prostate gland or the urethra.

\* For this important case I am indebted to Mr Turner.

The cases which I have now described have been selected with the view of illustrating the leading varieties of Apoplectic affections. They seem naturally to arrange themselves under the three forms which I have already alluded to.

1. Those cases which are immediately and primarily apoplectic.
2. Those which begin with sudden and violent headache, and pass into coma *gradually*. Those, for the sake of distinction, we may call the comatose cases.
3. Those which are distinguished by palsy and loss of speech without coma.

### I.—OF THE APOPLECTIC CASES.

The apoplectic attack is a sudden deprivation of sense and motion, the patient falling down as in a profound sleep, the face being generally flushed and the breathing stertorous. In tracing the history of such affections, the following circumstances deserve our attention.

1. Many of them are speedily fatal, and we find on dissection extensive extravasation of blood.
2. Many of them recover speedily and perfectly; and in these probably such extravasation did not take place.
3. In many of the fatal cases, we find only serous effusion, often in very small quantity, and having in other cases observed effusion to an equal or greater extent, without apoplexy, we cannot consider the effusion as the cause of the disease.
4. In many fatal cases, no morbid appearance can be detected on the most careful examination.

Thus the disease again resolves itself into two important divisions, apoplexy with extravasation of blood, and apoplexy without extravasation, and without any morbid appearance, or what may be termed *simple apoplexy*. The latter affection opens a field of investigation, most interesting and important, but, at the same time, one of the most difficult that we meet with in the whole extent of medical science.

It is unnecessary to multiply cases of simple apoplexy, or apoplexy fatal without any morbid appearance. The records of medicine abound with examples of it, and with extensive controversies in regard to its nature and cause. In a remarkable case of it which occurred to Willis,\* he supposes, that the ani-

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\* Willis, De Anima Brutorum, Part II. p. 276.

mal spirits were suddenly extinguished or suffocated by certain malignant or narcotic particles. Seelmatter ascribes it to a sudden relaxation of the nerves, Nicolai to a spasm of the meninges, and Lecat and Weikard to a spasm of the nerves and vessels of the brain. Kortum endeavours to reconcile the discordant opinions of his predecessors, by referring all these cases to a new species of apoplectic affections, which he styles *Apoplexia Nervosa*. Upon the same principle, other modifications of apoplexy have been contended for, which have been supposed to include these obscure and inexplicable cases, as the *apoplexia convulsiva*, and *apoplexia hysterica* of Burserius, Tissot, and other writers. Tissot\* mentions a woman who, after complaining for some time of headach, was attacked with great and sudden increase of the pain, accompanied by loss of speech, and died in a short time. On dissection no morbid appearance could be detected. A young woman, mentioned by the same writer, having suffered from a fright during the flow of the menses, the discharge stopped, and she became subject to frequent "lypethymia." After having suffered from this and various other symptoms for several months, she fell into a profound sleep, from which nothing could rouse her: this continued four days, she then came out of it, and appeared to be recovering, when after several days she was seized with severe headach, anxiety and convulsions, and died. No morbid appearance could be detected in any of the viscera. Lecat attaches much importance to a case which occurred to him, in which, after fatal apoplexy, he found no morbid appearance except a small quantity of extravasated blood, not exceeding a tea-spoonful. This, he contends, could not account for the disease upon the principle of pressure, but was to be considered rather as an effect than a cause; an effect of the spasm of the vessels which he conceived to be the proximate cause of apoplexy. This explanation did not satisfy his contemporaries, and various doctrines were brought forward to account for this form of the disease. Some maintained that the medullary substance of the brain is much more susceptible of compression than the cineritious; but the prevailing opinion was, that there are certain parts of the brain, where, by retarding the course of the animal spirits, slight causes of compression are capable of producing the most urgent symptoms. Hence arose a new and extensive controversy respecting the origin and progress of these animal spirits, and the course by which they make their exit from the brain. This

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\* Tissot, Epist. Med. Var. p. 80.

important function was by one assigned to the aqueduct of Silvius, by another to the fourth ventricle, by a third to the infundibulum, by a fourth to the choroid plexus and straight sinus; and fatal apoplexy was supposed to be produced by very slight causes existing at these particular parts, and even by causes so minute as altogether to elude observation. To these ingenious speculations we cannot assign a much higher place than to the ethers and vortices of the old philosophy, but the number and variety of them admit of this conclusion, that it has been matter of extensive observation, that apoplexy is in many cases fatal without any morbid appearance, and in others with appearances so slight as to be altogether inadequate to account for the disease.

The speculations to which I have now referred have been succeeded by the doctrine of increased determination of blood to the head, but I think it may be doubted whether this expression will bear examination, or whether it conveys any precise principle. The blood being propelled in every direction by an impulse primarily derived from the heart, it is not easy to conceive how, in the natural state of the parts, it should be propelled to the head with greater force, or in greater relative quantity than to any other part of the body. Any interruption to the passage of the blood in the descending aorta, might, indeed, give rise to an undue pressure upon the carotid and subclavian arteries, and if an artery be enlarged from whatever cause, the quantity of blood contained in it must be increased, but these principles, the effect of which we see in the enlargement of anastomosing branches, when a principal artery has been tied, have nothing to do with the doctrine of apoplexy. The brain, indeed, from its extreme delicacy, may be more likely than other organs to be affected by a general increase of the quantity of blood, or a general increase of its impetus, but I know no principle on which we can suppose, that, in the natural state of the vessels, the blood can be sent with greater impetus, or in greater quantity into the carotid, than into the subclavian, or any other great artery. To these considerations we must add the important fact, that the apoplectic attack often takes place with symptoms opposite to those that would accompany determination to the head, did such a state really exist, the face being in many cases pale and the pulse feeble. Upon all these grounds, I think we must admit that the doctrine of determination to the head is not supported by the principles of pathology, and does not accord with the phenomena of apoplexy.

The most simple illustration of the apoplectic state is derived from those cases in which it is distinctly traced to an external

cause. A boy mentioned by Zitzilius had drawn his neckcloth remarkably tight, and was whipping his top, stooping and rising alternately, when, after a short time, he fell down apoplectic. The neckcloth being unloosed, and blood being drawn from the jugular vein, he speedily recovered.\* Kortum mentions a Swedish officer, who, to make his men look well in the face, obliged them to wear their collars very tight; the consequence was, that, in a few years, half the regiment died of apoplexy.† Strangulation, when the neck is not dislocated, seems to be simply apoplexy. A man, brought after execution to Sauvages, was recovered by three bleedings, sat up and talked, his breathing and deglutition being natural. After a short time, the part of his neck where the cord had been applied began to swell, so as evidently to impede the circulation in the veins of the neck; he became drowsy, his pulse and respiration slow, without dyspnoea, and in a few hours he died apoplectic.‡ A woman mentioned by Wepfer, recovered after execution under the same treatment. After her recovery, she was for some time affected with vertigo, which subsided gradually.§

The apoplectic state, as it occurred in these examples, could neither depend on increased quantity of blood, nor increase of its impulse, but simply upon *interrupted circulation*, and this principle, I think, will be found to accord with all the phenomena of simple apoplexy. By the term interruption, I here mean such a derangement of the circulation in the head, that more blood enters by the arteries than can be transmitted by the veins. Such derangement, it is evident, may take place from various causes. It may either depend upon a condition of the arteries connected with general plethora of the system, in which more than the usual quantity of blood is carried into the head, or upon causes impeding the return by the veins, the quantity entering by the arteries remaining unchanged. The whole phenomena of apoplexy do, accordingly, bear evidence, that the disease does not depend upon one peculiar morbid action, but upon a variety of causes, agreeing with each other only in their final influence upon the functions of the brain. What affections, for example, can be more apparently different, than apoplexy affecting a man in the vigour of life, full, flushed and plethoric, accustomed to high living and intemperance, and apoplexy affecting an old woman, thin, pale, and withered, exhausted by la-

\* Act. Acad. Scienc. Sueciv. An. 1757.

† Kortum, de Apoplexia Nervosa, p. 20.

‡ Sauvages, Nosolog. Method. Vol. I. p. 679.

§ Wepfer, Histor. Apoplecticorum, p. 167.

hour, poverty, and wretchedness? We cannot easily believe that the state of the vessels is the same in these two cases, but the symptoms may be similar; they may both recover under similar treatment,\* and if they should be fatal, we perhaps can detect no difference in the morbid appearances. They must therefore agree in some leading principle, and this I conceive to be the interrupted or deranged circulation to which I have alluded. If we investigate the nature of this condition of the vessels of the brain, I think we shall find reason to believe that it may arise from various and very different causes, but that when it has been induced, its effects upon the brain are nearly the same, and that they may frequently be obviated by similar treatment. The causes of this interrupted circulation I think may be referred to the following heads:

I.—*Derangement of the relation betwixt the Arteries and Veins of the Brain, in connection with a general state of Plethora.*

To illustrate the doctrine which I propose under this head, I state a case which is entirely hypothetical. Suppose an artery and a vein running side by side in a non-elastic canal, which they exactly fill; it is probable, that the circulation in the vein will be very much affected by the condition of the artery. While the quantity of blood in the artery is in the natural and healthy state, the circulation will go on in a healthy manner. But if, in connection with a plethoric state of the system, the quantity of blood in the artery be much increased, the first effect will be a certain enlargement of the artery, or increase of its area, especially during the contraction of the heart. If the vein increased in the same ratio, the circulation would still go on without interruption, but the canal in which the vessels run, and which they exactly fill, is, by the supposition, unyielding, consequently the vein cannot be enlarged; on the contrary, the immediate effect of the enlargement of the artery will be a certain compression of the vein, and a certain interruption of its circulation. This interruption, indeed, will only take place during the contraction of the heart, and consequent dilatation of the artery; when the artery contracts, it will be removed; but hence will arise an unnatural state of the circulation, which will very much affect the functions of the organ in which it occurs. The degree of it will vary in different cases, according to the extent of the cause on which it depends, and it is easy to conceive it ex-

\* See cases 22d and 23d.

isting in such a degree, that the natural state of the circulation is entirely suspended, or, in other words, in such a degree, that more blood enters by the artery than can be transmitted by the vein. In this hypothetical case, I have supposed that the artery and vein exactly fill an unyielding canal, which, when the artery is enlarged by plethora, prevents a corresponding enlargement of the vein. The case will not be altered, if we suppose that they run in a cavity which they do not fill, but the remainder of which is exactly filled by an inelastic substance. Now this, I conceive, is no hypothetical case, but the precise condition of the blood-vessels of the brain. These vessels are inclosed in a cavity formed by the bones of the cranium, and the remainder of the cavity is exactly filled by an inelastic substance, the brain. They cannot, therefore, admit of much increase of the quantity of blood which enters them, without deranging the circulation in the manner which I have supposed. If the arteries are enlarged by plethora, the veins are prevented from a corresponding enlargement, hence a certain derangement of the circulation, producing, I imagine, the headach, throbbing, giddiness, tinnitus, and other analogous symptoms, which mark the tendency to apoplexy. From increase of the same cause, or the addition of some incidental one, as an occasional increase of the impetus of the blood, the interruption at last reaches that point, at which more blood enters by the arteries than can be transmitted by the veins—then occurs the paroxysm of simple apoplexy. It is accompanied by flushing of the face, turgidity of the features, and throbbing of the arteries about the neck and the temples: for the blood, impeded in the internal carotid, passes off with increased impetus by the branches of the external. Upon the same principle, when a great artery has been tied, the part betwixt the ligature and the heart appears to pulsate with increased violence, the collateral branches may be seen to beat with additional force, and the blood is transmitted by them in increased quantity.

That in the ordinary cases of apoplexy, there is an increased flow of blood into the branches of the external carotid, is probable from many circumstances. The unusual quantity of blood which flows from the integuments in opening the head in such cases, has been taken notice of by many writers, particularly by Morgagni and Dr Cheyne. In some of Dr Cheyne's cases, he collected about lb. i. in this manner. Mr John Bell somewhere mentions, that having injected the head of a man who died of an affection of the brain, for the purpose of making a cast, he found the features so distorted by the injection, the lips so protruded, and all the superficial vessels so

swelled, as to make the preparation useless. Now, I venture to state from what I have observed, that this determination of blood to the surface of the head may be found in a very high degree in many cases, in which no corresponding deviation from the healthy state can be observed in the vessels of the brain; \* and this seems to afford considerable probability to the doctrine which I have proposed, that these appearances of the external parts are not the result of general determination of blood to the head, but of a particular determination into the external carotid, in consequence of a certain interruption of the circulation in the internal.

If the circulation in the internal carotid were interrupted in the manner which I here suppose, we have the strongest ground from analogy for believing, that such consequences would immediately follow; and there are circumstances which give considerable probability to the conjecture, that such interruption really occurs in the apoplectic attack. I shall only at present mention a singular fact, which is related by Sir Everard Home. In a fatal case of apoplexy, he found the internal carotid of the right side "filled by a solid coagulum of blood, which extended some way into the smaller branches." †

The peculiar situation of the blood-vessels of the brain which I have supposed under this article, lies at the root of the whole pathology of apoplexy. It is such as cannot occur in any other organ, because there is no other organ like the brain closely confined in a cavity of bone; and I think, if the necessary effects of this be carefully considered, it will afford considerable probability to the doctrine which I have proposed, respecting the derangement of the circulation of the brain.

## II.—*Causes which directly diminish the capacity of the Venous System of the Brain, or any part of it.*

If any considerable quantity of blood (say  $\frac{3}{4}$  iv.) has been extravasated on the surface of the brain, as in a case of injury of the head, coma is produced, and this is called compression of the brain. But in what manner does this compression operate? We have no reason to suppose that the brain itself is capable of being compressed into a smaller compass, so as to make room for this extraneous mass. Something, however, must have yielded to make way for it, and this is most likely to be the vascular system of the brain. Less blood by  $\frac{3}{4}$  iv. will therefore

\* See Case VII.

† Philosophical Transactions for 1814, page 478.

be now contained in the vessels of the brain, than was contained in them before the injury. If this diminution of quantity affected the arteries and veins equally, it probably would produce no urgent symptoms. But the quantity entering by the arteries is undiminished, or diminished only by the very trifling ratio which the quantity extravasated bears to the whole blood of the body, consequently the compression will chiefly or entirely act upon the veins. From the smaller impetus of the blood in them, they are less capable than the arteries of resisting its effects, and from the situation of great part of them on the surface of the brain, they are more immediately exposed to it. Hence will arise a derangement of the circulation analogous to that which I have supposed under the former article, more blood entering by the arteries than can be transmitted by the veins—the consequence is coma, or simple apoplexy. When the compressing cause (whether extravasated blood, or depressed bone) is removed, the circulation recovers its healthy state, and the coma disappears. Upon the same principle, when a part of the cranium has been destroyed, leaving a portion of the brain covered only by the integuments, pressure upon the part is apt to induce a state of coma, which disappears when the pressure is removed. Many cases of this kind are on record, one particularly by Haller, of a man who exhibited himself in Paris for money.

A cause of this kind may exist in a smaller degree, so as in general to occasion only the lesser derangements of circulation, but in this state, apoplectic attacks, often of a slight kind, may be induced by various occasional causes, affecting the circulation of the brain, such as bodily exertion, stooping, stimulating liquors, &c. In a former paper, I have described a case in which a tumour formed by thickening of the dura mater, occupied a considerable space upon the surface of the brain. The patient was liable to giddiness, and slight apoplectic affections, and at last was seized with complete hemiplegia, and fatal apoplexy.\* Facts are wanting on this important subject. It remains to be investigated what diseases the veins of the brain are liable to, which may operate in this manner as a cause of apoplexy. Many cases are on record, in which, after long continued diseases of the brain, the only morbid appearance to be detected was a thickened state of the membranes at particular parts. Whether this thickening could have affected the veins, or whether the veins themselves could have been affected by the chronic inflammation which produced this thickening of the membranes, is at

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\* Edin. Med. Journal, Vol. XIV. page 291.

present only matter of conjecture. It is worthy of investigation, how far such a cause, as I suppose under this head, may be connected with apoplectic attacks of a slighter kind, occurring very frequently. Cases are observed in which a person suffers, in the course of a few years, fifteen or twenty attacks, and in the intervals experiences little or no bad effect from them. It is probable, that such cases must be different in their nature from the common form of apoplexy. A gentleman mentioned by Lancisius, who had long suffered from hemicrania, was seized, about the age of 50, with an intense pain in the temple, and soon after had an attack of apoplexy, from which he soon recovered. From this time he had an apoplectic attack once or twice every month. This went on through the following autumn and winter, and he at last died suddenly in one of the attacks. Under the right side of the os frontis, the membranes were much thickened, and connected with the thickened portion, there was a sort of polypus on the surface of the brain.\* In a case of this kind, it is probable, that after evacuations, while the quantity of blood continues in a reduced state, the circulation in the brain goes on without interruption, but that, as the quantity again increases, the tendency returns to that interruption which produces the apoplectic state, and that the attack may also be induced by various causes, which occasion a temporary increase of the impetus of the circulation. In some of the cases, it is probable that this interruption is of so temporary a kind, that it ceases as soon as the increased impetus of blood has subsided—in others, it is more serious, and of longer continuance, and at last, from causes which elude our observation, is fatal.

### III.—*Diseases of the Sinuses, impeding the passage of the Blood from the Veins, or diminishing the area of the Sinuses at particular parts.*

The diseases of the sinuses present a most interesting field of investigation, in which hitherto very little has been done. Willis thought he observed such thickening of the dura mater about the sinuses, as appeared to him to impede the passage of the blood into them from the veins. In this paper, I have described an old case of hemiplegia, in which the longitudinal sinus appeared to be diminished in its area at a particular part; and in a former paper, I have described a remarkable disease of the lateral sinus, in which it had evidently transmitted no blood for

\* Lancisius de Subitaneis Mortibus, cap. xi.

some time.\* This case ascertains the existence of such disease, and I think it probable, that accurate observation may disclose important facts in regard to the diseases of the sinusses, which may throw much light upon many affections of the brain. Is it objected, that in the case in my former paper, to which I have now referred, apoplexy did not take place? I answer, that there was a degree of stupor bordering upon it, and that the large and repeated blood-letting probably prevented perfect coma. For in such disease of the sinus, it is probable, that the circulation will be more likely to go on in a healthy manner when the quantity of blood in the body has been considerably reduced. If the disease exists in a more chronic form, the safety of the patient will depend on keeping the blood extremely moderate, both in quantity and impetus, and any considerable increase of either will be likely to give rise to the interruption which I suppose to constitute apoplexy. On the same principle, when any contraction exists in the openings of the heart, the safety of the patient depends upon the quantity of blood being kept extremely low, and any increase of its quantity, or increase of its impetus, lead to those frightful paroxysms of dyspnoea which occur in such affections.

#### IV.—*Interruption of the Circulation in the Veins of the Neck.*

I have already mentioned some examples of apoplexy, induced by causes of this kind. Tumours on the neck have been known to have the same effect, a remarkable example of which is related by Mr John Bell.†

#### V.—*Disease of the Lungs and of the Heart.*

The effect of respiration upon the functions of the brain is well known, and it is extremely probable that a certain interruption in the circulation of the brain takes place during expiration. In a young child, whose breathing was much oppressed, I lately saw distinctly the fontanelle elevated during expiration, and collapsed during inspiration. A girl aged 13, whose case is related by Mr Jamieson, had lost a considerable portion of the cranium in consequence of an extensive fracture, but the wound healed favourably, and the integuments were completely cicatrized. After seven months, she was seized with hooping-cough,

\* Edin. Med. Journal, Vol. XIV. page 288.

† Bell's Principles of Surgery, Vol. II. page 556.

and in one of the fits of coughing the cicatrix was burst open, and a considerable portion of the brain forced out through the opening. She died paralytic and comatose after five days.\* A boy mentioned by Hildanus took a bet that he would sneeze a hundred times, and did so by tickling his nose with a feather; he was immediately seized with violent headache, and dimness of sight, which were relieved by cupping, and a seton in the neck.†

The brain is obviously affected by disorders of breathing, and by particular exertions of the organs of respiration, as in blowing wind instruments: and apoplectic attacks have frequently been traced to this cause. In case 5th I have described an example of an old affection of breathing terminating by simple apoplexy, and another in case 4th, terminating by apoplexy with serous effusion. Wepfer mentions a gentleman long subject to difficult breathing, who became suddenly speechless, and fell down in apoplexy, which was soon fatal. No disease could be detected in the brain, the only morbid appearance was in the lungs.‡ Lancisius relates several examples in which affections of the lungs and of the heart were fatal by apoplexy, and in which no morbid appearance could be detected in the brain.§ A gentleman whom I attended for many years was liable to frequent paroxysms, which sometimes resembled epilepsy, but frequently amounted to perfect apoplexy. They attacked him in the night, and for several years before his death he was seldom a night free from them; frequently they occurred several times in a night. After being many times relieved by blood-letting, and the other usual remedies, he at length died apoplectic. On examining the body, the only morbid appearance was extensive ossification of the heart; not a vestige of disease could be detected in the brain. He had for a long time a very irregular pulse, but never complained of any symptom in the thorax. Facts are wanting on this interesting subject. It is probable that when the disease is in the right side of the heart, the effect of the interrupted circulation may be likely to fall upon the brain, and that when it is in the left side, it will more probably affect the lungs.

There is reason to believe that certain apoplectic affections are connected with a disease of the heart, the nature of which is

\* Edinburgh Medical Essays and Observations, Vol. II. p. 217.

† Hildani Opera, Obs. XXIV.

‡ Wepfer, Historia Apoplecticorum, p. 619.

§ Lancisius de Subitaneis Mortibus, p. 52.

extremely obscure. In a case described by Dr Cheyne,\* the attack commenced with a severe pain striking from the scrobiulus cordis to the back; it was accompanied by headach, and soon followed by convulsion and coma. There had been for several days before the attack œdema of the legs. Large and repeated blood-letting was employed, and the coma subsided after 24 hours. Hemiplegia remained, which went off gradually in seven or eight days, and the œdema disappeared along with it. I have described a singular case (case 7th) which had very much the appearance of apoplexy, but in which the only morbid appearance was a remarkable emptiness of the heart and great vessels. This condition of the heart presents a subject of much obscurity. It has been observed as the only morbid appearance in many cases of sudden death, some of which resembled syncope, and others apoplexy. Several examples of it are described by Mr Chevalier,† in one of which, in particular, he proceeded to the examination, "fully prepossessed with the persuasion that the patient had died of apoplexy." On the most careful examination, however, nothing could be detected in the brain. The only morbid appearance was this complete emptiness of the heart, and it extended into the vena cava, to the distance of several inches from the heart. Two cases described by Mr Wood in the same paper, which recovered, are considered by Mr Chevalier as examples of the same affection. In one of them the patient was suddenly seized with extreme faintness and loss of muscular power, his speech was indistinct, and his pulse scarcely to be felt, but his face was suffused with blood; he had difficult breathing, and great anxiety. In the other case, which was more severe, the pulse was only 29 in the minute, and very feeble, while the vessels of the skin and of the tunica adnata were loaded with blood. Both these cases seemed to be relieved by stimulants and opium; in the last, the symptoms continued nearly a whole day. A woman mentioned by Bonetus was suddenly seized with headach, dimness of sight, and ringing in the ears; she lost her voice, and died in four hours. The lungs were considerably diseased; the only other remarkable appearance was, that there was not a drop of blood in the heart or great vessels, but the head was not examined.‡ That these cases are not of the nature of syncope, appears from

\* Cheyne on Comatose Diseases, p. 87.

† Medico-Chirurgical Transactions, Vol. I.

‡ Boneti, Sepulchretum Anatomicum. Vol. I. p. 883.

the suffusion of the countenance, which in some of them was very remarkable. Several of them bear a strong resemblance to apoplexy, but the nature of them is very obscure.

*VI.—The Circulation in the Brain may be interrupted by diminution of the impulse of Blood entering the Head, as in Syncope and Disorders of extreme exhaustion.*

This is an interruption of a very different kind from that which I suppose to take place in apoplexy, but there are circumstances connected with it which throw considerable light on the pathology of the brain. There is a remarkable resemblance betwixt the symptoms which occur in such cases, and many of the symptoms connected with apoplexy, and this resemblance appears to give considerable probability to the doctrine which I have proposed, that apoplexy does not depend upon pressure or determination, but simply upon interrupted circulation. What is syncope, but an abolition of sense and motion? It is preceded by giddiness, tinnitus aurium, confusion of thought, loss of recollection, and failure of sight, and every surgeon has seen the syncope after blood-letting pass into violent convulsion. In what, then, does syncope differ in its symptoms from apoplexy? only in the state of the general circulation, which in the one is much weakened or nearly suspended, and in the other is in full vigour. Now, in relation to the brain, what principle can we find which is common to these two opposite conditions, but that of interrupted circulation? The interruption, indeed, in the two cases, proceeds from very different causes, but still the interruption is the only principle in which they agree. It is farther extremely probable that, by diminution of the quantity of blood or diminution of its impulse, the circulation in the brain will be more impeded than in any other part of the body. In other parts, where the vessels are exposed to the pressure of muscles, and to the general pressure of the atmosphere, they will contract and accommodate themselves to the diminished quantity of blood, and thus the circulation will go on with little interrup-  
tion. But the brain being closely covered from atmospheric pressure by the bones of the cranium, such contraction cannot take place so readily, and probably only in a very limited degree. Hence the circulation in the brain will be more easily interrupted by evacuations than in other parts. Syncope, accordingly, is one of the first effects of haemorrhagy; and in the end of diseases of exhaustion, patients frequently fall into a state resembling coma a considerable time before death, and

while the pulse can still be felt distinctly. I have many times seen children lie for a day or two in this kind of stupor, and recover by wine and nourishment. It is often scarcely to be distinguished from the proper coma which accompanies affections of the brain. It attacks them after some continuance of exhausting diseases, such as tedious and neglected diarrhoea; the patients lie in a state of insensibility, the pupils dilated, the eyes open and insensible, the face pale and the pulse feeble. It may continue for a day or two, and terminate favourably, or it may be fatal. This affection is the only disease that I have observed, which corresponds with the “*apoplexia ex inanitione*” of the older writers. It differs from syncope in coming on gradually, and in continuing a considerable time, perhaps a day or two; and it is not like syncope induced by sudden and temporary causes, such as haemorrhagy, but by causes of gradual exhaustion going on for some time. It differs from mere exhaustion in the total abolition of sense and motion, while the pulse can be felt distinctly, and is in some of the cases of tolerable strength. I have seen in adults an affection approaching to this, and from the same cause. A man considerably advanced in life, from a neglected diarrhoea fell into a state very much resembling coma; his face pale and collapsed, but his pulse of tolerable strength. An elderly lady, from the same cause, had loss of memory and squinting. Both these cases recovered by wine and opiates. In the former, blistering on the neck was also employed. Richter states that amaurosis has been occasioned by haemorrhage, cholera, and tedious diarrhoea, and mentions particularly a dropsical woman who became blind when the fluid was evacuated from her abdomen by tapping. On this curious and interesting subject I shall only at present add the following remarkable illustration from an affection of hearing. A gentleman about 30 years of age came to Edinburgh from a distance for advice in regard to an obscure affection, referred chiefly to the stomach, which had reduced him to a state of extreme weakness and emaciation. As the debility had advanced he had become considerably deaf, and when I saw him he was affected in the following manner: He was deaf while sitting erect or standing, but when he lay horizontally with his head very low, he heard perfectly. If, when standing, he stooped forward, so as to produce flushing of the face, his hearing was perfect, and upon raising himself again into the erect posture, he continued to hear distinctly as long as the flushing continued; as that went off the deafness returned. Upon the whole, it seems probable, that a certain state of the circulation in the brain is necessary for the healthy

discharge of its functions ; that they are equally impeded by the interruption which takes place in apoplexy, and the diminished impulse which occurs in syncope ; and that there is a remarkable similarity in the symptoms which occur in these two opposite conditions. In what manner these disorders of circulation affect the nervous system, and cut off all intercourse betwixt the external world and that mysterious part of our being which thinks and wills, and reasons, is a point in the arrangements of the Almighty Creator, which must ever elude our most eager researches. The pathologist, like the inquirer in every other department of science, “ tantum facit et intelligit, quantum de naturæ ordine observaverit, nec amplius scit aut potest.”

The state of simple apoplexy, in whatever manner it has been induced, may be fatal without producing any evident change in the organization of the brain, or leaving any morbid appearance that can be detected on the most careful examination. In what manner this takes place we know not, and never can know, but the fact is fully ascertained. In other cases, however, it does produce certain obvious appearances, such as take place from interrupted circulation in other parts of the body. The effects of such interruption are most familiar to us in the lungs. When from diseases of the heart, or of the lungs themselves, the circulation is there obstructed, either permanently or in paroxysms, two effects of the obstruction are familiar to us, extravasation of blood, or haemoptysis, and serous effusion, or hydrothorax. In this manner we have every reason to believe, that the obstruction connected with simple apoplexy may give rise to extravasation, and to serous effusion. This, I imagine, may be the source of the extravasation of blood in those cases, in which it is in so very small a quantity as to be inadequate to account for the disease upon the principle of pressure. I shall afterwards have occasion to allude to another class of cases, accompanied by extravasation in large quantity, which are quite distinct from these in their nature, and I think differ from them also remarkably in their symptoms. I do not, however, mean to say, that in the former case the extravasation is necessarily in small quantity, for a large vessel may give way in consequence of the obstruction, but that the quantity is very often so small as renders it extremely probable that it is the effect rather than the cause of the disease ; and that it may be so, is supported by analogy derived from the affections of the lungs to which I have alluded.

That serous effusion is produced by obstructed circulation, the arteries of a part conveying the blood to it freely, while

there is some obstruction to its return by the veins, is familiar to us in every part of the body. We see it in the œdema produced by a tight bandage, by enlarged glands, by diseased ovaria, and by the pressure of the gravid uterus. We see it in ascites produced by induration of the liver, and in general dropsy produced by diseases of the lungs and of the heart. It is extremely probable that it should also be an effect of obstructed circulation in the brain, and this, I imagine, is the source of it in those cases which are from the first apoplectic. I have formerly described another class of these affections, in which serous effusion in the brain is connected with chronic inflammation. The two cases are easily distinguished from each other; the one beginning with inflammatory, the other with apoplectic symptoms.

These observations lead me to the consideration of SEROUS APoplexy. Much has been written on this subject, and much attention has been bestowed on the symptoms by which it may be distinguished from the sanguineous. The latter is said to be marked by flushed face and strong pulse, and by occurring in persons in the vigour of life; the former by paleness of the countenance, weakness of the pulse, and by affecting the aged and infirm. Much importance has been attached to this distinction upon the ground that the practice which is proper and necessary in the one, would in the other be useless or injurious. On this doctrine I submit the following observations.

I.—*The Distinction betwixt the Symptoms of Sanguineous and Serous Apoplexy has no foundation in Experience or Observation*, many cases which are accompanied by pale face and feeble pulse, being found to be purely sanguineous, and serous effusion being the only morbid appearance in others, in which there occurred all the symptoms which are considered as indicating sanguineous apoplexy. It is unnecessary to enter into any detailed proof of this statement, the accuracy of which is familiar to every one who has cultivated the study of morbid anatomy. I have described several cases, accompanied by extensive extravasation of blood, in which there occurred paleness of the countenance, weakness of the pulse, and coldness of the whole body; and others, in which there was only serous effusion, though the symptoms had been those assigned to sanguineous apoplexy. Portal has described a series of cases which afford the same result. Of three which presented all the symptoms of serous apoplexy, one was saved by repeated

blood-letting, and in the other two which were fatal there was found extensive extravasation of blood.\* On the other hand, Morgagni has described cases which exhibited the symptoms of sanguineous apoplexy, but in which he found only serous effusion. Case 8th of this paper forms a remarkable addition to all these observations. If any case could be confidently considered as serous apoplexy, this was such. Dropsical effusion had existed in the body for months; in defiance of every remedy it had been progressively gaining ground. There were symptoms indicating its existence, both in the thorax and the abdomen; the patient then became comatose and died; but though dropsy was found in the other cavities, no disease could be detected in the brain. If, therefore, there really exists such a distinction as sanguineous and serous apoplexy, we know no symptom by which they can be distinguished.

II.—*I object to the term Serous Apoplexy entirely, and I think it extremely doubtful whether there really exists such a disease.* If by serous apoplexy we mean to express simply an apoplectic disease in which on dissection we find serous effusion, we express a fact, and the name is harmless. But if we mean a disease in which serous effusion takes place immediately, so as to be the direct cause of the apoplexy, we express not a fact but a doctrine, and a doctrine which is extremely doubtful. In regard to it the following considerations are worthy of attention. (1.) In other parts of the body, serous effusion is seldom or never a primary disease. In the abdomen we trace it to peritoneal inflammation, or organic disease obstructing the venous circulation; in the thorax we trace it to pneumonic inflammation, or to other diseases of the lungs and of the heart. In the brain it is in many cases distinctly traced to inflammatory action, and it is *probable* that there also it may arise from obstructed circulation. In neither the thorax nor the abdomen do we meet with it as a primary disease, and it is *not probable* that it should occur as a primary disease in the brain. (2.) In other parts of the body serous effusion takes place slowly, and does not accumulate at once in such quantity as to induce urgent symptoms. It is therefore not probable that it should accumulate in the brain with such rapidity as to produce the symptoms of an apoplectic attack. (3.) The quantity of effused

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\* Portal, Mémoires sur Plusieurs Maladies, Vol. I. p. 280; and Vol. II. p. 216.

fluid bears no proportion to the degree of the apoplectic symptoms. We often find it in small quantity when the apoplectic symptoms have been strongly marked and long continued. We find it in large quantity when the symptoms have been much slighter. We find it in very considerable quantity when there have been no apoplectic symptoms at all. Several examples of this I have referred to in a former paper; in one of which 3vij. were found in the brain without apoplexy; and in Mr Turner's case, in this paper, there was extensive effusion, both on the surface of the brain and in the ventricles, without any apoplectic symptoms. Finally, we observe all the symptoms strongly marked, which lead us to expect serous effusion, and yet we find none, as in case 8th. Upon every principle of sound reasoning, these considerations should make us hesitate very much concerning the doctrine of serous apoplexy, and I think entitle us to consider serous effusion in these affections as one of the terminations of simple apoplexy. This affection, we have seen, may be fatal without effusion, and without any morbid appearance, and the cases which terminate in this manner cannot be distinguished in practice from those which terminate by effusion.

In the examination of cases of simple apoplexy, much importance has been attached to turgidity of the veins upon the surface of the brain. I have formerly expressed my doubts whether any reliance is to be placed in this appearance. It certainly occurs in cases, in which there had existed no symptom in the brain, and even in diseases of considerable exhaustion. On the other hand, it does often occur in apoplectic affections, in many of which no other morbid appearance can be detected. In some apoplectic affections, again, the accumulation of blood appears to be rather in the arteries in the substance of the brain, while in others, the arteries have appeared to contain less blood than in the healthy state of the parts. If the conjectures which I have hazarded in regard to the various causes of the apoplectic state shall be found to be worthy of any credit, I think these apparent diversities may be reconciled. In apoplexy connected with general plethora, as under the first head of causes, we should expect to find marks of accumulation in the arterial system of the brain. In cases, again, which come under the causes of the 3d, 4th, and 5th heads, we should expect to find accumulation in the veins. From the particular situation of the vessels of the brain to which I have formerly alluded, it is probable, that as the whole quantity of blood in the head does not admit of much variation, any considerable increase of its quantity in the one system of vessels, must be attended by a diminution in

the other. In some apoplectic cases, accordingly, there are appearances of congestion in the arterial system of the brain, while in others the substance of the brain is said to be paler than natural. In some again, the veins on the surface have been found remarkably turgid, while in others they have presented no unusual appearance; and in a remarkable case after intoxication, which lately occurred to my friend Dr Hunter, accompanied by some extravasation, all the veins on the surface of the right hemisphere were perfectly empty. A similar appearance is mentioned in several cases by Morgagni.

But may not the veins on the surface of the brain become turgid without any relation to apoplexy? Upon the principles of hydraulics, it seems probable, that the vessels of the brain must always contain a considerable quantity of blood, even when the other parts of the system are much exhausted of it. This results from the peculiar situation of the brain, to which I have formerly alluded,—its confinement in an uninterrupted cavity of bone, in which it is closely shut up from atmospheric pressure. In such a cavity, the blood probably cannot be diminished below a certain quantity, except something entered to supply its place, and, in the language of the old philosophy, “to prevent a vacuum.” Now, suppose the system in general to be falling into a state of great exhaustion, from haemorrhage, or any other cause, the first diminution of the quantity of blood sent into the head by its arteries, would probably only produce a corresponding diminution of the quantity sent out of it by the veins. As the one quantity continued to diminish, the other would probably diminish also, producing a remarkable languor of circulation within the brain, but leaving nearly a uniform quantity actually contained in its vessels; and, from the tendency of the arteries to contraction, it is probable that, in such a case, the accumulation would chiefly take place in the veins. Now go to the last step in this process, when the blood is sent into the arteries of the brain for the last time; it would still be the tendency of the arteries to contract upon this quantity to a certain degree, and propel it forward into the veins. At the conclusion of such a case, therefore, the veins of the brain might appear turgid with blood, and this appearance has accordingly been observed in cases far removed from the nature of apoplexy, and even in diseases of great exhaustion.

I have mentioned one remarkable case, and referred to others, in which extensive effusion existed in the brain without any comatose or apoplectic symptoms. Did coma depend upon direct compression of the brain, we cannot conceive how six or eight ounces of fluid should exist in the cranium without pro-

ducing it; but upon the principle which I have proposed of interrupted circulation, I think these cases may be accounted for. When such a quantity of fluid exists in the brain, the blood circulating there must be diminished by the same quantity; but however much it may be diminished, while it continues to circulate without interruption, there will be no coma. I do not at present mean to investigate the manner in which this may take place, but the possibility of it is obvious. It may proceed from a general diminution of the mass of blood to such an extent, that the quantity sent to the head is lessened in proportion to the space occupied by the effused fluid: and even without this, we can conceive the possibility of the pressure within the cranium being so distributed as to affect the arteries and the veins equally. In this case, though the quantity of blood entering the head would be diminished, that which did enter would circulate without interruption. Pressure upon the surface of the brain I have supposed to produce coma, by diminishing the capacity of the veins, while the quantity of blood entering by the arteries remains undiminished: if both arteries and veins were affected equally, I imagine there would be no interruption, and no coma. These conjectures, I think, receive some probability from several cases of tumours of great size, seated in the deep parts of the brain, which, though extensively affecting the organs of sense, have not produced symptoms of oppressed brain, while tumours of a smaller size, seated on the surface, have appeared to be connected with apoplectic paroxysms.

In these speculations on the pathology of apoplexy, I do not think I have advanced any thing that is not supported by observation or analogy, and open to be established or overturned by farther observation. The various classes into which I have arranged the causes of apoplexy, are in some measure conjectural, and I chiefly propose them as subjects for research. I neither expect nor wish them to be received as principles, but as the anticipations of principles, and as such to be tried by the test of observation and experience.

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## II.—OF THE COMATOSE CASES.

The cases to which, for the sake of distinction, I have given this name, differ remarkably from apoplexy. They are not at first apoplectic; or if there be, at the very first attack, loss of sense and motion, this state is recovered from in a few minutes, without any remedy. The prominent symptom at the first invasion is a sudden attack of violent headache, the patient generally screaming out from the violence of it. Sometimes, as in

cases 13, 16, and 18, he falls down, faint, pale, and exhausted, often with slight convulsion, but recovers from this state in a few minutes. In other cases, (as in case 14,) he does not fall down, but feels a sudden and great uneasiness in his head, generally with paleness, sickness, and often vomiting. The first attack being so far recovered from that the patient is often able to walk home, the symptoms go on under various modifications. The fixed pain in the head continues, often referred to one side of it, and generally there is vomiting. The patient continues for some time, perhaps an hour or two, (less or more, in different cases,) cold and feeble, with cadaverous paleness of the countenance; his pulse weak, and rather frequent. He is quite sensible, but oppressed. By degrees, he recovers heat, and the natural appearance of the countenance, and the pulse improves in strength. The face then becomes flushed—he is more oppressed,—answers questions slowly and heavily,—and at last sinks into coma, from which he never recovers. The period occupied by these changes is various. In case 14, from the first attack to the commencement of coma, there intervened about five hours—in case 18, twelve hours—in case 16, three days. Death followed the appearance of coma, in case 14, in seven hours—in case 13, in thirty-two hours—in case 16, in two days. Other varieties occur which are exemplified in the other cases. In case 15, the period from the first attack to the commencement of coma was but a few minutes, though death did not take place in less than twenty-nine hours. In other cases, death happens very soon after the appearance of coma, though there had been a considerable interval before it, perhaps several hours from the first attack. In case 18, there was an interval of a fortnight, without any urgent symptom; the complaint then returned, and was speedily fatal. In case 17, which seems to belong to this class, after the coma had continued three days, there was complete recovery from it, and it was succeeded by maniacal delirium. This, after seven days, was again followed by coma, which in three days more was fatal. In case 13, there was also, after evacuations, a temporary recovery from the coma, about twelve hours after its appearance, and twenty hours before death.

As far as my observation extends, the cases which belong to this class are generally fatal.\* In their symptoms, they form a modification of the disease remarkably different from apo-

\* An eminent writer, to whom I have frequently referred, observes, "I have not known a patient recover, who, in the beginning of the attack, complained of sudden pain in his head."—CHEYNE on *Comatose Diseases*, p. 18.

plexy ; and on dissection, we find none of those varieties and ambiguities of morbid appearance, which occur in the apoplectic cases, but uniform and extensive extravasation of blood. From the whole history of them, I think there is every reason to suppose, that they depend upon the immediate rupture of a considerable vessel, without this rupture being preceded by the apoplectic state of congestion, or interrupted circulation. The rupture probably arises from disease of the artery at the part which gives way. At the moment when it occurs, there seems to be a temporary derangement of the functions of the brain, but this is soon recovered from :—the circulation then goes on without interruption, until such a quantity of blood has been extravasated as is sufficient to produce apoplexy, in the manner which I have supposed under the second head of causes. We see in some of the cases, accordingly, that large evacuations were capable of removing the coma for a short time, though it very soon returned, and was fatal. In their whole progress, these cases are strictly analogous to the cases of extravasation on the surface of the brain from injuries. The patient recovers from the immediate effect of the injury, walks home, and after some time, perhaps an hour or two, becomes oppressed, and at last comatosc. The extravasated blood being in this case removed by the operation of trepan, the coma disappears.

The varieties of the symptoms in this form of the disease, are such as we might expect upon the principle which I have proposed in regard to the nature of them. In some, it is probable, that the extravasation goes on progressively until such a quantity has been accumulated as is sufficient to produce the fatal coma. In others, there is reason to suppose, that soon after the rupture has taken place, the haemorrhage is stopped by the formation of a coagulum, and after a considerable interval, bursts out afresh, and is speedily fatal. This probably occurred in cases 16 and 18. In such cases, the two extravasations can sometimes, on dissection, be distinguished from each other by their appearance. In some cases, a second extravasation takes place in another part of the brain, the interrupted circulation produced by the first, probably giving rise to the second. A double extravasation of this kind occurred in case 17, the patient never having had any previous attack. In this case, the temporary recovery from the coma was remarkable: the apoplectic state had taken place two hours after the attack, and had continued three days. At that time, it is probable, that the evacuations employed had the effect of restoring the circulation, which went on in a very imperfect manner, until it was again interrupted by the fresh extravasation.

The rupture seems in general to take place in the substance of the brain, from which it bursts its way by laceration, either into the ventricles, or to the surface, or in both these directions at once, as in a case described by Morgagni. It is in vain, in most cases, to attempt to trace it to particular vessels; Dr Cheyne was able to do so in some instances, but in general numerous vessels must be laid open by the extensive laceration; hence probably the appearance which has been observed, as if the extravasation had taken place from numerous vessels at once. Sometimes the blood has appeared to be discharged from the vessels of the choroid plexus, sometimes from the veins on the surface of the brain, and, in a case described by Dr Douglas, it was from a rupture of the left lateral sinus.\* In cases of this class, it is probable that the extravasation is generally slow, and requires some time to produce the apoplectic state. In some instances, however, it takes place with much greater rapidity, so as to produce immediate apoplexy, and sometimes almost immediate death. The former probably occurred in case 1, in which the extravasation was in the cerebellum. Of the latter, many examples are on record. Indeed, I think it probable, that those cases which are instantly, or very rapidly fatal, are generally of this kind. I have seen no example of simple apoplexy being fatal instantly; it usually requires a considerable time to run its course, as from 24 hours to two or three days.

The origin of the extravasation, in cases of the second class, I have conjectured to be rupture, arising from disease in the artery. Such disease, accordingly, has been frequently observed, and is described in several examples by Morgagni and others. It, in some cases, consists of ossification, in others of that peculiar earthy brittleness, which Scarpa has described as leading to anenrism. In a case of apoplexy, almost instantly fatal, which occurred to my friends Dr Duncan junior and Mr Wishart, they found on dissection "great extravasation from extensive laceration, owing evidently to a diseased state of the arteries, which every where had the earthy brittleness of Scarpa."

In regard to extravasation of blood in the brain, then, the doctrine which I have hazarded is, that it proceeds from two very different causes; that, in the one case, it arises from the immediate rupture of a considerable vessel without previous derangement of the circulation; that in the other, it is the result of the apoplectic state, the blood being forced out by the arterial action in consequence of the interrupted circulation, in the same man-

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\* Edinburgh Medical Essays and Observations, Vol. VI. p. 106.

ner, as haemoptysis is produced by obstructed circulation in the lungs. In the former case, it is always in large quantity, in the latter, the quantity is often extremely small, though it is not necessarily small, but may in some cases be as large as in the other. Indeed, there is no reason why the two causes should not be combined in the same individual, the state of simple apoplexy first taking place, and then, in consequence of the interruption, a considerable vessel giving way, which had been previously disposed to do so by disease of its coats. This doctrine I again propose as in a great measure conjectural, and as a subject for farther observation. It will be rendered probable if it shall appear, that those cases in which the extravasation is very small, were in general from the first apoplectic, and that it is large in those which began with violent pain, and passed into coma gradually. Considerable light may be thrown upon the subject by attention to cases of extravasation from injuries. A collection of facts derived from these, would enable us to form some estimate of the quantity of blood which is necessary to produce apoplexy by direct compression. We know that a considerable quantity may be extravasated without having this effect; but it is probable that the quantity may be different in different cases, as, according to the plethoric state of the vessels, the circulation may be in some cases more easily interrupted than in others.

Numerous varieties occur in the seat of the extravasation which I cannot enter upon at present, but which are deserving of being investigated, in relation to their effect upon the symptoms. In one of Dr Cheyne's cases, there were three distinct extravasations; one in the substance of each corpus striatum, and one in the third and fourth ventricles. The symptoms were apoplectic, with some convulsion, and after some time paraplegia. In another, the extravasation was in the substance of the pons Varolii, from which it had forced its way into the fourth ventricle. The symptoms were severe headache, followed by perfect apoplexy, without paralysis. In a case which occurred to a friend of mine, there was a round coagulum, the size of a musket bullet, situated in the iter ad quartum ventriculum. The symptoms were paralysis of the left arm, in a few minutes followed by apoplexy, which was fatal in a few hours. In a singular case, described by Mr Howship, the extravasation was distributed in the substance of the medulla oblongata, in such a manner, as to form several thin strata, alternating with strata of the cerebral matter. The case was a sudden attack of perfect apoplexy, which was fatal in two days.\*

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\* See also a remarkable case by Dr Duncan jun. in his Reports of the practice in the Clinical Ward, No. xxiv.

**III.—OF PARALYSIS.**

The paralytic attack generally consists of loss of speech, with hemiplegia. In some cases the speech is not affected; in others loss of speech is the only symptom at the first invasion, and sometimes one limb only is affected, most commonly the arm. The attack is in some cases sudden,—in others it is preceded for some time by headache. It differs from the apoplectic attack in the absence of coma, the patient frequently appearing sensible of his situation, understanding what is said to him, and answering by signs. Many of these cases recover speedily and perfectly, the disease leaving no bad consequences behind it. (Cases 22 and 23.) In the progress of those which have not this favourable termination, the following varieties chiefly deserve our attention.

1. Many of them pass into apoplexy, perhaps in a few hours, the paralytic attack being only the prelude to the apoplectic.

2. Some of them, without shewing any tendency to apoplexy, do not recover. The patient, perhaps, improves so far as to be able to walk, dragging the paralytic limb by a great exertion, but after this makes no farther improvement; and after having continued long, perhaps years, in this condition, dies of a fresh attack, or of some other disease. (Case 20.)

3. In a third variety, the patient makes no improvement at all, is confined to bed in the most helpless state for several weeks, and then dies gradually exhausted, sometimes comatose for a day or two before death. (Case 19.)

In endeavouring to investigate the morbid conditions connected with these various forms of the disease, we meet with considerable diversity.

1. *In the cases which pass into apoplexy the same appearances are observed as in the apoplectic attack.*

1. *Extravasation of Blood.*—Some cases of extravasation are immediately apoplectic, others are at first paralytic. We know not the cause of this difference, for we frequently can detect no difference in the morbid appearances. In general, hemiplegia seems to be produced when the extravasation is on one side, either in one ventricle or on the surface, or in a new cavity in the substance of the brain. From the history of these cases, it is probable that coma is induced either by the extravasation passing to the other side, as from one ventricle into the other, or merely by increase of the quantity, though it may be confined to one side, the smaller quantity being connected with paralysis, the greater with apoplexy. A man mentioned by Morgagni had loss of speech and hemiplegia of the left side, and died in ten days;  $\tilde{\text{vii}}$ .

of blood were found in the right lateral ventricle. Another with the very same morbid appearances had paralysis of the left arm only, and died on the 5th day. In a third, who had palsy of the left side, and died apoplectic in twelve hours, blood was found to have passed into all the ventricles. In some of these cases again, palsy appears on both sides before coma is induced, as in a case by the same writer, in which there was palsy of the whole left side, and of the right arm. Blood was found in all the ventricles, but it seemed to have come from the right, the substance of the brain there being lacerated. In other cases, complete palsy of both sides has been observed before apoplexy took place. Extravasation on the surface also occasions palsy of the opposite side, and, as the quantity increases, seems to induce coma. On the other hand, extravasation may take place in all these situations, inducing fatal apoplexy without having induced paralysis. This is exemplified in several cases in this paper. In one, all the ventricles were full of blood, which, there was every reason to suppose, had come from the left; in another, all the ventricles had evidently been filled from a new cavity in the right hemisphere, and in a third, from a similar cavity, blood had spread extensively on the surface of the right hemisphere. But in none of these cases was there any paralytic symptom, though in all of them there was a considerable interval betwixt the attack and the occurrence of coma. It appears, therefore, that paralysis is not necessarily produced by extravasation of blood, though confined to one side, taking place slowly, so as to give opportunity to observe the progress of the symptoms, and in such quantity as at last to produce fatal apoplexy.

2. In many of these cases we only find on dissection serous effusion, often in small quantity. A man mentioned by Morgagni had palsy of the right arm, and died apoplectic in two days. On dissection no morbid appearance was observed except serous effusion, both in the ventricles and on the surface of the brain. Another had loss of speech and palsy of the left side, and died comatose at the end of a month. Considerable effusion was found on the surface of the brain, but very little in the ventricles. A third had loss of speech and palsy of the right side, then became comatose, and died in five days. The ventricles contained about  $\frac{3}{4}$  jij. of fluid; there was also a good deal on the surface of the brain, which appeared to be most abundant on the right side. I have formerly given my reasons for believing that serous effusion, in apoplectic cases, is not a primary affection, but a termination of the state which I have named simple apoplexy. I have also described cases in which such effusion existed without paralysis, and in the cases in which

they existed together, the effusion was distributed equally over the brain, except in one case now quoted from Morgagni, in which it was most abundant on one side, and that was the same side with the disease. From all these considerations we must conclude, that, in the cases to which I now refer, the effusion was not the cause of the paralysis, but that it was the effect or the termination of a certain state of the circulation in the brain with which the paralysis had been connected from the first invasion of the disease. This state of the vessels, affecting the whole brain equally, constitutes simple apoplexy. I see no objection to the supposition that an analogous disorder of the circulation may affect part of the brain, deranging the functions of that part only, so as to produce paralysis of certain muscles. The whole phenomena of palsy bear evidence that many cases of it depend upon some such inorganic, or what I may term moveable cause. We see hemiplegia take place in the highest degree, and yet disappear completely in a few days. We see it disappear more gradually, so that the parts are perfectly recovered in a few weeks. We see it exist for many weeks or months, without any improvement, and then, from some change which eludes our observation, take a turn for the better, and very suddenly disappear. These circumstances seem to give considerable probability to the conjecture which I have hazarded; their reference to the treatment of paralysis I shall have occasion to allude to afterwards.

II. *The old cases of palsy, in which the patient has continued for years without improvement, though otherwise in tolerable health, and has at last died of some other disease, present a most interesting subject for investigation, which I can at present allude to but very imperfectly.* I do not here refer to those cases which have come on gradually, and are connected with organic disease, but to those which have either supervened on an apoplectic attack, or have come on suddenly in the proper paralytic attack. Now, these cases are often cut off by a fresh paralytic or apoplectic attack, and then we cannot say with certainty which of the morbid appearances were connected with the old, and which with the recent disease. Hence the importance of those cases in which death at last takes place from some other disease; a faithful record of such cases would tend to throw much light on the pathology of paralysis. I have described a remarkable example of this kind, (Case 20,) in which the disease continued without relapse and without improvement for fifteen years, and yet nothing could be detected but serous effusion in the brain, with a slight appearance of disease in the longitudinal sinus. A man, mentioned by Morgagni, died of

pneumonia, after having been long affected with paralysis of the right side, accompanied by loss of feeling; the disease had remained after an old apoplectic attack. No morbid appearance could be detected in the brain, except some serous effusion on the surface, and a still smaller quantity in the ventricles. A woman, mentioned by the same writer, had hemiplegia for three years, was confined to bed, and died of gangrene of the nates:—there was considerable effusion on the surface of the brain, very little in the ventricles, and no other morbid appearance. In cases of this kind, we are in the habit of believing that some deep-seated and irreparable injury has been done to the brain. Perhaps this opinion has been received without sufficient examination. The cases which I have mentioned were of the most favourable kind for ascertaining the point, yet no such injury could be detected. This opens a wide and most interesting field of inquiry which I am not prepared to enter upon at present; but I think there is much reason to believe, that many of these paralytic affections are connected with some disordered state of the circulation in the brain, or with a state of disease which is not organic, and which we are not entitled to consider as hopeless.

Among the causes of these old paralytic affections, have generally been reckoned cavities in the substance of the brain, containing the remains of former extravasations of blood; and some writers have contended, that extravasated blood may lodge in this manner for a long time in the brain, not only without being fatal, but even without producing any urgent symptom, after the removal of the original apoplectic attack. I have some doubts whether this opinion rests on any good foundation. The case in Morgagni which is often referred to in support of it, was that of an old woman who died apoplectic in the hospital of Pavia. On one side of the brain was found a large cavity containing extravasated blood of a recent appearance, and on the other side a small cavity containing a dark-coloured glutinous matter, which he supposed to be the remains of blood extravasated in a former attack. It is added, however, that no account could be obtained of the previous history of the patient, nor even a correct account of the fatal attack itself, consequently there is no evidence of a former attack.\* Now, in case 17th of this paper, the same appearances occurred as in the above-mentioned case of Morgagni. In this case, however, I know that there never had been any attack previous to the fatal one, consequently it is reasonable to conclude, that the two extra-

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\* *De Causis et Sedibus Morborum.* Epist. III. § 6.

vasations had taken place at different periods of the same attack; and I must believe that this might have occurred in Morgagni's case, except I see some reason to believe the contrary. I do not think the other cases mentioned by Morgagni on this point are more satisfactory. In the two cases, Epist. LX. § 2 and 6, there were distinct extravasations; but there is no evidence that these had taken place in distinct attacks; for we have every reason to believe, that several different extravasations may take place in the same attack, as in a case by Dr Cheyne, formerly referred to, in which it had taken place in each of the corpora striata, and in the third and fourth ventricles. Wepfer's case, quoted by Morgagni, proves nothing, for he only supposes, from the direction of the wound, that extravasation must have taken place; and the case communicated to Morgagni by Plancus was evidently of a different nature, for he says expressly it was an abscess. It seems to have been an old disease of the brain, in which paralysis was connected with chronic induration, and was fatal by suppuration, a disease of which I have given several examples in a former paper. Some other cavities which have been supposed to be the remains of apoplectic attacks, I think have evidently been the result of chronic inflammation, and not of apoplexy. The same observations I think apply to Mr Abernethy's cases,\* and, upon the whole, I consider these important questions as still undecided; Whether extravasated blood may lodge in the brain without being soon fatal? What change the blood undergoes in such a cavity? and Whether such extravasation ever exists as the cause of long continued paralysis?

In a case by Rochoux,† there is reason to believe that a cavity of this kind, containing coagulated blood, had continued three months and a half, and this is the longest period that I have been able to find in any case, the history of which I can consider as satisfactory. In this case, the patient was completely paralytic on the right side, and the intellectual faculties were very much impaired. She died of coma, coming on gradually, without a fresh apoplectic attack; and an irregular cavity was found in the left corpus striatum, an inch in diameter, containing blood which was "fibrous, filamentous," and of the colour of "terre de Sanguemine." Another case by the same writer, which was of longer continuance, was evidently of a different nature, for the cavity contained purulent matter.

\* Abernethy on Injuries of the Head.

† Rochoux, Recherches sur l'Apoplexie, p. 95.

III. *An important circumstance in the history of paralytic affections is, that many of them are connected with a state of the brain which is not apoplectic, but inflammatory.* I do not here allude to paralytic affections occurring at an advanced period of such diseases, and connected with suppuration, but to paralysis taking place suddenly, so as to bear a close resemblance to the proper paralytic or apoplectic attack. The first attack in these cases is frequently accompanied by convulsion, and the farther progress of them is sometimes that which I have mentioned as the third form of the paralytic affections. In other cases, after a certain period, the disease puts on the proper characters of inflammatory action. In some cases, partial paralytic affections are the first symptoms, while no symptom appears which distinguishes them from ordinary paralytic attacks, or points out their inflammatory origin. A young man, for the history of whose case I am indebted to an eminent practitioner, Mr Clarkson of Selkirk, after bathing in the Tweed, lay down on the bank and fell asleep without his hat, in a very hot day, in June 1818. When he awoke, he had lost his speech, but walked home, and appeared to be otherwise in good health. He recovered his speech imperfectly on the following day, and afterwards lost it, and partially recovered it, several times during the four or five succeeding days. During this period he was observed to be dull and forgetful. Afterwards he had dilated pupil, squinting, and double vision, with a dull uneasiness in the back part of his head, without acute pain. His pulse varied from 60 to 86. Notwithstanding the most judicious and active practice, he sunk gradually into coma, and died in 24 days. On dissection, a considerable part of the brain was found in a state of suppuration; the remainder exhibited marks of inflammatory action, and there was effusion in the ventricles. This affection may be more rapidly fatal, so as to shew the disease in its first or inflammatory stage, and with a still closer resemblance to apoplectic paralysis. A man mentioned by Morgagni, had severe headache, speedily followed by hemiplegia of the right side, and then palsy of all the lower parts; he died in a few days. On dissection, the whole medullary substance of the right hemisphere was found of a dark brown colour, with considerable effusion in the ventricles. I think there is every reason to believe that this was an example of the same disease, which, at a more advanced period, produced the appearances described in case 19th of this paper, or that they were both of an inflammatory nature, the first proving fatal in the early stage, the second by suppuration, at an advanced period. I have, in a former paper, given reason to suppose, that chronic

inflammation may go on for a considerable time before it comes to suppuration, and I have described a case, which terminated by suppuration, after the patient had been in the most helpless state of hemiplegia for more than two months.\* Numerous examples are on record which illustrate this modification of the disease. A man mentioned by Morgagni, was suddenly attacked with hemiplegia of the right side, accompanied by delirium and convulsion, and died in a few days. The only morbid appearance was, that the left lateral ventricle was full of purulent matter. A woman, aged 59, was suddenly attacked with loss of speech, and paralysis of the right side and right eyelid, followed by coma and death after several days. An abscess, the size of a large walnut, was found in the substance of the left hemisphere, in which soft corrupted cerebral substance was mixed with some bloody fluid; there was also effusion in the ventricles. In another case, there was sudden loss of speech and death in two days, and the anterior part of both hemispheres of the brain was covered with purulent fluid. There was also effusion under the arachnoid membrane. A man, aged 60, had been ill for some time with violent tormina and diarrhoea, when he was suddenly seized with hemiplegia of the right side, and loss of speech, and died on the fourth day, with his other faculties entire. The left corpus striatum was found so eroded, as to be nearly separated from the neighbouring part of the brain. The surface of the brain on the left side was also eroded in two places, and there was effusion in the ventricles. In one of the cases now mentioned, it will be remarked that the palsy was on the same side with the disease in the brain. A similar case is mentioned by Dr Coindet. A man, aged 60, after being for some time affected with loss of memory, was seized with severe headach, paralysis of the left side, and convulsion of the right. He died in four days. The whole left hemisphere was found reduced to a state of remarkable softness; there was considerable effusion in the right lateral ventricle, and not a drop in the left.† A similar case, with paralysis on the same side with the disease, is related by Bonetus.‡ A similar disease, with palsy on the opposite side, occurred in a boy mentioned by Sauvages. He had palsy of the right side, at first accompanied by profound sleep, afterwards by incoherent talking, and he died in four days. The brain and cerebellum, on the

\* On Chronic Inflammation of the Brain, Case X.

† Coindet, Mémoire sur l'Hydrencephale, page 47.

‡ Boneti, Sepulchretum Anatomicum, Lib. I. sect. 5. obs. 34.

left side, were found "putrid, corrupted, and sphacelous." \* In a case of hemiplegia of the right side, fatal in sixteen days, mentioned by Dr Home, † the only morbid appearance was a considerable quantity of bloody purulent fluid, on the surface of the medulla oblongata on the left side, and the same appearance about the medulla spinalis.

A woman mentioned by Wepfer had very much an apoplectic appearance. She was carrying a load upon her head in a hot day, when she felt as if something had given way in her head; and under a similar exertion, some days after, she experienced the same feeling to such a degree that she nearly sunk under it. From that time she could not retain her urine, but had no other symptom, until several months after, when she was suddenly seized with hemiplegia of the left side; her speech was indistinct, and her mouth distorted. She had violent pain in the back of the head, and in the right eye, and was delirious for fourteen days. She then became sensible, and began to improve; her speech became distinct, and after eight weeks she had slight motion of the paralytic limbs. The motion improved gradually, and after some time she could walk with the assistance of a stick, but still complained of headache. About eight months after the former attack, in rising out of bed one morning, she felt a return of the paralysis of the left side, and a severe pain in the sole of the right foot: she had also vertigo and severe headache, referred chiefly to the right side of the head. After continuing several months without any farther change, she became dropsical, with cough and dyspnoea; severe pain continued in the right foot, and she died, gradually exhausted, about seven months from the last attack of hemiplegia, having retained her sight, hearing, and mental faculties to the last. On dissection, much effusion was found, both on the surface of the brain, and in the ventricles. An abscess, the size of an egg, surrounded by a very firm sac, was found bordering on the right ventricle. It contained a turbid fluid, and the cerebral substance near it was eroded and ulcerated. ‡ The case of another woman mentioned by the same writer, illustrates a different modification of the disease, and shews how long it may go on without being fatal. After suffering for some time from severe headache, she fell down apoplectic, and lay in that state

\* Sauvages, *Nosolog. Methodica*, Vol. I. p. 834.

† Home's *Clinical Experiments*, p. 252.—See also a case by Dr Duncan jun. *Reports, &c.* No. xxv.

‡ Wepfer, *Historia Apoplecticorum*, p. 558.

for three days. She then recovered, with palsy of the right side; and after some time, this improved considerably, so that she could walk with assistance. She then became maniacal, often escaped and wandered in the woods, and several times attempted to destroy herself; the right side remained much weaker than the other. After continuing in this state for three years, she died of pneumonia. On dissection, the pia mater was found thickened, and very vascular; there was considerable effusion both in the ventricles and on the surface of the brain. Both lateral ventricles and the third ventricle were covered on their inner surface by a thick mucus of a crocus colour, and there was the same appearance on the choroid plexus. There were many hydatids on the choroid plexus on both sides, as large as peas, and one on the left side as large as a filbert. These examples will serve to illustrate this modification of paralysis, which is not connected with an apoplectic, but an inflammatory action in the brain. It appears that there is no uniformity of the symptoms, nor any precise mark by which it can be distinguished from the ordinary apoplectic paralysis. Many of the cases are accompanied by convulsion, but this does not occur in all; the convulsion sometimes appears on the same side with the paralysis, the convulsion attacking first and leaving the part paralytic; and sometimes they appear together, the convulsion on the one side, and the paralysis on the other. Many of them, again, are remarkable from not passing into coma, the patient remaining entire in his intellect to the last, or until a very short period before death; others, however, pass into coma at an early period. In some cases the pulse is frequent, but in others it resembles the pulse of apoplexy.

I think there is reason to suppose that some of these cases of inflammatory paralysis are distinguished from the apoplectic paralysis, by the attack in the former being less rapid. A man, aged about 35, (a shoemaker,) whom I saw very lately, under the care of Dr Tweedie, and whose case I believe to be of this kind, had pain extending from the left side of his forehead along the upper part of the head, and a remarkable loss of feeling in his right cheek. This loss of feeling extended gradually down the right side of his neck, and to his arm; the arm became weak, and the weakness increased gradually. The leg of the same side then became affected in the same manner; but the progress of the complaint was so gradual that he continued his work for a week after the attack; his leg and arm were becoming gradually more and more paralytic, but it was not till the end of the week that the paralysis had increased to such a degree as rendered him unable for his

usual labour. This occurred about a week ago, and since that time the complaint has been nearly stationary. He can walk with a dragging and imperfect motion of the right leg, but has very little use of his arm; he has still pain along the upper part of the head; the numbness of his cheek is gone, and his speech has never been affected. This course of symptoms constitutes a case remarkably different from the attack of the apoplectic hemiplegia, which is generally sudden and complete. Whether the difference depends upon such a difference in the cause as I here suppose, I do not determine, but rather, at present, propose it as an interesting subject for observation. I think it is rendered probable by many of the facts which I have mentioned, both in this paper, and in my former paper on Chronic Inflammation of the Brain. I do not, however, mean to say that every case of inflammatory paralysis is distinguished by this particular progress of the symptoms. On the contrary, in some cases that are ascertained to be of this nature, the attack seems to be as rapid as in the apoplectic paralysis; and we naturally expect such differences in the inflammatory cases, depending probably on the extent of the disease in the brain, which in one case may affect at once a large portion of it, and in another may begin in a very small portion, and extend gradually. It appears, however, from several of the cases which I have mentioned, that disease of this kind, of no great extent, may be connected with extensive paralysis. I have already alluded to those cases in which the paralytic attack is preceded or accompanied by convulsion. These will probably be found to be of the inflammatory kind, especially when the convulsion has been confined to one side of the body, or to one limb, paralysis of the part immediately succeeding it. A remarkable example of this has been described in my former paper. (Case 7.)

A most important circumstance in the history of the inflammatory paralysis is, that all the symptoms may take place while the disease in the brain is in the state of simple inflammation, and that it may not have advanced beyond that state while they go through the usual course, and terminate in fatal apoplexy. I lately saw a young woman, who, after being for some time affected with symptoms indicating a tendency to disease in the brain, was found one morning to have lost her speech. She then gradually sank into coma, with paralysis of the right side, and died on the ninth day. The only morbid appearance was a part of the brain, the size of a large walnut, in a state of high inflammation; it was at the upper and inner part of the left hemisphere, in contact with the longitudinal sinus. There was no effusion, and no other morbid appearance, ex-

cept adhesion of the membranes to the inflamed portion by coagulable lymph, which was deposited between them. A woman, aged 30, whose case is related by Dr Treutler,\* had been ill for two months with dropsy, which had followed intermittent fever, and was connected with disease in the spleen. In the third month of her illness, she complained of a feeling of weight in the occiput, towards the right side, with dimness of sight and a great propensity to sleep. Her hearing became daily more and more obtuse, her speech was very indistinct, and her memory was lost. She at last seemed to lose the power of every voluntary muscle, so that she could neither move her legs nor arms, nor raise her head. Finally, she had convulsions and apoplectic attacks, and died suddenly about the end of the third month of her illness ; that is, less than a month from the commencement of these symptoms in the head. In the posterior lobe of the right hemisphere of the brain, behind the lateral ventricle, a portion, the size of a large walnut, ("fructus regiae juglandis,") was in a state of high inflammation ; the membranes adhered to the surface of the brain in several places ; where that did not occur, there was serous effusion under the arachnoid membrane. There was no fluid in the ventricles ; there were hydatids in the choroid plexus, which were most numerous on the right side. The spleen was much enlarged, and extravasated blood, to the amount of several pounds, was found in the abdomen ; it was partly contained in the cavity of the omentum, partly between the laminæ of the mesocolon, and partly under the peritonæal coat of the descending colon. In a former paper, I have referred to a remarkable case by Mr Howship, † in which inflammation appeared to have spread along the membranes of the brain from one place to another, and at last to the membranes of the spinal cord, producing, in its course, a succession of urgent symptoms, and leaving distinct traces of its progress in extensive deposition of coagulable lymph. At an early period of the complaint hemiplegia occurred, which went off after a short time, though the disease advanced progressively to a fatal termination. It is therefore not unreasonable to conclude, that the paralysis existed in connection with active inflammation of the membranes ; for long before death, when the inflammation was found to have terminated by extensive deposition of coagulable lymph, the paralysis had disappeared.

The terminations of the inflammatory paralysis, when its pro-

\* Treutler, *Auctarium ad Helminthologiam Humanæ Corporis*, page 1.

† Howship's *Observations in Surgery and Morbid Anatomy*, page 74.

gress is not arrested at an early period, are principally three. (1.) It may be fatal, as we have seen in the inflammatory stage, with all the symptoms of perfect apoplexy. (2.) It may be fatal by suppuration, and this may be either in the form of the encysted abscess, or of that extensive undefined suppuration which has been called sphacelismus cerebri. \* (3.) The inflammation may subside, leaving induration of a part of the brain, and thus producing permanent paralysis. This state of disease may continue a long time without being fatal. I have endeavoured to trace its progress when treating of chronic inflammation of the brain. It is chiefly when the patient dies of some other disease that we find it in the state of simple induration; when the disease itself is fatal, it is generally by the indurated part passing into suppuration. A gentleman whom I saw lately along with Mr William Brown, had been for four years affected with paralysis of the right side, and indistinctness of speech. Without any return of symptoms in the head, he died gradually exhausted by dyspnœa and general dropsy, connected with disease of the heart. In the anterior part of the left hemisphere, we found a portion of the brain, the size of a large walnut, very much changed in its appearance, being of a brownish yellow colour. This portion was much harder than the healthy cerebral substance, except at its lower part, where it was soft, approaching to suppuration. Induration of a part of the brain, however, does not always produce paralysis, it sometimes occasions convulsion. Several examples of this I have mentioned in my former paper, in one of which the convulsion was confined to the leg and arm of the right side, the induration being in the left hemisphere. On this interesting subject I shall only add a remarkable case by Mr Hill, † which illustrates several important points in the history of the inflammatory paralysis. A girl, aged 19, was first seized with numbness of the left hand, which extended gradually along the arm, and was accompanied by headache and vomiting. After two months the whole left side had become paralytic, and at the end of another month a small tumour, like a pea, appeared by the side of the bregma, which being repeatedly opened with a lancet, discharged matter with some relief. After seven months

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\* In my paper on Chronic Inflammation of the Brain, I have stated that I had not seen the undefined suppuration (or sphacelismus) accompanied either by convulsion or paralysis. From several cases, however, which are mentioned in this paper, it appears that it may be accompanied by either or by both of these affections.

† Hill's Cases in Surgery, page 130.

more, Mr Hill found a small hole in the right parietal bone, about a quarter of an inch in diameter, which was plugged up by a firm substance from within. The trephine being applied at this place, an abscess was discovered within the cranium, which discharged about  $\frac{3}{4}$  iv. of matter, and a small excrescence like a wart, arising from the dura mater, which had plugged up the orifice in the bone. There was considerable relief after the discharge, but protrusion of the brain took place; and she died, gradually exhausted, two months after the operation, having retained her faculties until two days before her death. On dissection, much effusion was found in the ventricles, and destruction of the brain by suppuration for about two inches round the opening in the skull.

In a former paper I have referred to many cases in which remarkable symptoms, both paralytic and convulsive, were connected with inflammatory action affecting various parts of the brain; some in which they were connected with inflammation and thickening of the membranes, and others in which very urgent symptoms of this kind were connected with a singular disease of the pericranium. In one remarkable case, in which the right arm was paralytic and withered, there was a small tumour on the left parietal bone with caries of the bone under it, and a perfect cure was obtained by the application of the trephine.

IV.—*Many paralytic affections depend upon diseases of the spinal marrow.* For these I refer to a former paper on that subject.

V.—*A paralytic state is known to follow severe rheumatism.* It may also be induced by long continued cold, without rheumatism having taken place. A man mentioned by Dr Clarke \* became paralytic in both legs, and partially in the arms, in consequence of being much benumbed with cold in travelling on the top of a coach. He derived benefit from mercury and warm-bath, and was nearly recovered in eight or ten months.

Dr Powel has described three cases of paralysis of one side of the face, producing great twisting of the mouth, and in one of them inability to shut the eyelid. In all the cases the affection came on immediately after exposure to cold by a cold wind blowing upon the side of the face which was affected. It was not accompanied by any other symptom, and they all recovered; two of them were well in eight or ten days; the third, a child, was not quite free of the complaint for three months.

They seemed to derive benefit from sudorifics and the application of steam.\*

VI.—*There is a singular modification of paralysis which seems to be connected with the state of the circulation in the affected part.* A lady mentioned by Dr Storer † was recovering from a pneumonic attack, when one morning, after a restless night, she was suddenly seized with an acute pain in the left shoulder, extending to the arm, and at the same time the whole left side became paralytic. The leg retained its feeling, but the hand and the foot were insensible to the prick of a needle. The parts were cold, and all the arteries in them were without pulsation. After a few hours the pain shifted to the leg and foot, and was there so severe as to occasion screaming. On the right side of the body the pulse was of good strength, and a little frequent. She had some obscure pain in the forehead, which was removed by bleeding with leeches. The pain of the leg and foot abated after twelve hours, and she had then no complaint except the paralysis. For several days she seemed to be improving a little in the motion of the parts, but they continued cold and without pulse. On the 5th day she had an uneasy feeling at the epigastrium, with sense of suffocation; her breathing became short and hurried, and she died in the night. The body was not examined. A gentleman, mentioned in the same paper, was seized with paralysis of the right arm as he sat at breakfast, having been previously in perfect health. He complained of no pain, but the arm was pale, and in every part of it without pulse: in the left arm the pulse was natural. After four hours he became faint, with quick and laborious breathing, and frequent pulse, and in two hours more died. The body was not examined. In the same Journal Dr Wells has described the case of a gentleman, subject to cough and dyspnœa, who awoke one morning with a severe pain in the left arm; in the afternoon it became benumbed and paralytic. The pain then ceased, and the arm was found to be without pulse. He continued in this state for two days, without any other complaint; and on the third day died suddenly, as he got up to go to stool. The paralytic arm only was examined after death, and in it no morbid appearance could be detected.

These singular affections were probably connected with disease of the heart or great arteries. Several years ago I saw a case

which may throw some light upon them, though the symptoms were not exactly similar. A woman, aged 73, having been previously in her usual health, was suddenly seized with violent pain of the whole right arm, accompanied by palpitation of the heart, inclination to vomit, and a pain extending across the thorax, from the breast to the back. The pulse of the affected arm was extremely weak, in the other arm it was 120, and strong, but irregular. After a day or two the pain in the right arm ceased, leaving the arm without pulse and weak, but not completely paralytic. After ten days the right thigh and leg were affected in the same manner, and went through the same course; then the left arm in five days more; and ten days after this the left thigh and leg. She was then confined to bed in a state of great weakness, and no pulsation could be felt in any artery except the carotids, and a little in the right humeral. In the carotid it was strong and frequent. The radial artery was felt like a firm cord under the finger, as if permanently distended with blood. She still had pain in the region of the heart, which at times became very severe; it impeded respiration, and prevented her from lying on the left side. She lived a month in this state; the dyspnœa and palpitation became gradually more and more severe, and she died gradually exhausted, two months after the commencement of the disease. Some days before death slight pulsation was perceived in the arteries of the left arm, and in the right it was more distinct than formerly. On dissection much fluid was found in the pericardium; and in the right cavity of the pleura. The heart was flaccid, and none of its cavities contained any blood. In the right sinus venosus there were two firm fleshy tumours or polypi; one the size of a pigeon's egg, attached to the side of the sinus by a slender pedicle, the other smaller, and more extensively attached. The whole arterial system was extensively ossified; in some places the diameter of the artery was considerably diminished by the ossification, and several of the great arteries were obstructed by firm coagula at particular points. This was most remarkable in the right common iliac, which was filled through nearly the whole extent of the common trunk, by a dark-coloured coagulum which was very firm, elastic, and dry. The left subclavian was also much diseased, and considerably contracted, and the aorta near the bifurcation was for about two inches almost entirely ossified. There was considerable effusion in the ventricles of the brain. The sinuses of the dura mater were remarkably empty.

This kind of disease may exist in a more limited degree, af-

fecting only the vessels of a particular part of the body. In this case it is apt to terminate by extensive gangrene. The limb is first affected with violent pain; this continues for a day or two; when it ceases the arteries of the part affected are found to be without pulse, and after some time it falls into gangrene. The gangrene which attacks the feet of old people is probably connected with disease of this kind in the extreme arteries. In a remarkable ease of it mentioned by Mr Naish,\* the gangrene began in the toes in the usual manner, and extended gradually, until in about a month it had reached the middle of the leg; the leg was then amputated four inches above the mortified part. During the operation two or three ounces of blood issued from the muscular parts, but on slackening the tourniquet not a drop of blood flowed, and the extremity of the artery was found hard and callous. The patient died on the fourth day. On examining the amputated limb, the arteries were found through their whole course extensively ossified. The trunk of the artery at the place of amputation was ossified in two-thirds of its circumference. About a quarter of an inch farther down it was entirely ossified, and its diameter so contracted that it would only admit a hog's bristle. Tracing the branches downwards, they were found in some places entirely ossified, in others free from ossification, and in others ossified on one side and membranous on the other. The disease was traced into some of the smallest branches in the foot. A gentleman, aged 67, whose case is described by Mr Cowper, † had lost the use of his lower extremities for nearly twenty years, and during that time had been so distressed with convulsive motions of the affected limbs, that sometimes he was not free from them for a quarter of an hour together, whether sleeping or waking. At length the toes of the left foot began to mortify, and the disease spread gradually, until unhealthy ulceration had extended above the ankle, laying bare one of the metatarsal bones. While this disease was going on, the convulsive motions of the left leg had been stronger than ever. The leg was amputated five inches below the knee, and it was remarked that there was very little bleeding from the arteries. On examining the amputated limb, the arteries were found ossified in the same manner as in Mr Naish's case. Six weeks after the operation gangrene attacked the other foot, and was fatal. The same writer describes a similar disease in the arm of a young woman, in whom also am-

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\* Philosophical Transactions, Vol. XXXI. page 226.

† Ibid. Vol. XXIII. page 1194.

putation was employed without success. The humeral artery was found extensively ossified, and so thickened in its coats that the cavity was contracted to less than a third of its natural diameter. It is remarkable that gangrene had not taken place in the case which I have described, as both the lower extremities had been without pulsation in the arteries for a month, and from the appearance of the right common iliac, it had evidently been for a considerable time completely impervious. In limbs that have been destroyed by extensive ulceration, remarkable diminution of the arteries has been met with. Two cases of this kind are described by Mr Grainger,\* which were saved by amputation, after such an extent of disease had taken place in one of them, that the leg as high as the knee was "denuded of all vessels, muscles, and ligaments, as are the bones collected in a charnel-house." In one of them he could find no artery that required to be tied, and in the other the trunk of the femoral artery could have been stopped with a pin.

There are singular facts upon record which seem to indicate peculiarities of the circulation in particular parts of the body, probably originating in the relation betwixt the vascular and nervous systems. I know a gentleman who, when heated by exercise, perspires over one half of his body and not on the other, the line being drawn with great precision from the forehead along the centre of the nose, and so downwards. When he is very much heated the other side perspires also; but this only occurs from great exertions, or great warmth; the singular perspiration of one side which I have mentioned is a matter of almost daily observation. A child mentioned by Dr Falconer became pale and emaciated on the whole left side of the body, without any evident diminution of muscular power, the right side remaining healthy. She recovered by the use of warm pumping. †

VII.—There are various other cases of paralysis which are foreign to the subject of this paper. Among these may be reckoned the palsy produced by lead and other poisons, by injuries of particular nerves, or tumours pressing upon nerves. Muscles also become paralytic from various injuries, such as over-distension. I have several times seen the deltoid remain paralytic after luxation of the humerus, and recover its action gradually, perhaps after several months.

In regard to the paralytic state in general, there are several

\* Grainger's Medical and Surgical Remarks, p. 182.

† Memoirs of the Medical Society of London, Vol. II, p. 208.

important circumstances which may be here referred to very shortly. In some cases of palsy there is loss of motion without loss of feeling; in others the feeling is lost also. Cases are also related, in which loss of feeling took place without loss of motion. Several examples of this are described in the Mémoirs of the Royal Academy of Sciences. The most remarkable is the case of a soldier, a very strong man, and able for all his duties, who had so completely lost the feeling of his right leg and arm, that he allowed the parts to be cut, or red hot iron applied to them, without complaining of any pain. A gentleman mentioned in the same paper had the same peculiarity in his right arm.\* In a case which is related in the Ephemeræ Naturæ Curiosa, there was loss of motion on the one side, and loss of feeling, without any diminution of motion, on the other.† In cases in which there has been loss both of motion and feeling, we frequently observe recovery of feeling without recovery of motion. Berdotus, on the other hand, describes a case in which there was recovery of motion without any recovery of feeling.‡ A similar case is related by Burserius.§ Increased acuteness of feeling in paralytic limbs has also been observed; and in a former paper I have referred to a case in which, connected with a disease in the brain, there was such an increased sensibility of the arm that the least breath of cold air excited convulsions. Dr Falconer || mentions a gentleman who, after a paralytic attack, had such a morbid state of sensation, that cold bodies felt to him as if they were intensely hot. When he first put on his shoes he felt them very hot, and as they gradually acquired the warmth of his feet, they appeared to him to cool. Paralytic parts sometimes become intensely painful; this occurred in case 19th; and in a former paper I have mentioned a case in which recovery from palsy was accompanied by such pain that the limb remained useless. When paralytic limbs are recovering, the recovery sometimes begins at the extreme parts of the limb, as the fingers and toes, and extends gradually upwards; and sometimes it begins in the parts next the body, and extends gradually to the extreme parts. Paralytic affections often begin by affecting a very small part of the body, as one arm, or the hand only, or sometimes one finger; the muscles of the tongue, of one side of the face, of the eyelids. We know not the cause of these varieties. Para-

\* Mem. de l'Acad. Royale des Sciences, an. 1743.

† Eph. Naturæ Curios. Cent. II. Obs. 196.

‡ Act. Helvet. T. VI. p. 191.

§ Institut. Medicin. Pract. Vol. III. p. 76.

|| Mem. of the Med. Society of London, Vol. II. p. 206.

plegia generally depends upon disease in the spine. It is sometimes, however, produced by affections of the head, as indurations of the cerebellum, or tumours about the medulla oblongata. It rarely occurs in connection with the apoplectic state, but there are examples of it. One is mentioned by Boerhaave in which it preceded apoplexy, and extravasated blood was found under the cerebellum, and about the top of the spine. In another, by Dr Cheyne, there was extravasation in the third and fourth ventricles.

An interesting part of the history of paralytic affections refers to those cases in which the paralysis is confined to one muscle or one set of muscles, and remains in that state for a long time without improvement, and without going farther. I saw a man lately whose mouth is so twisted to one side that the left angle of it is nearly on a line with the septum of the nose. He has no other paralytic symptom. Several years ago he went to bed one evening with violent headach, and awoke next morning with his mouth in this state. It has continued so without the least improvement, and without any return of head symptoms. From many circumstances in the pathology of the brain, I think there is reason to believe that such partial paralytic affections are originally connected with inflammatory action in a small part of the brain; that such diseases may go on to more extensive inflammation, or may soon subside, leaving a small part of the brain indurated and deranged in its functions. This may then continue for a long time in the state of simple induration, without producing farther disease, and may at last pass into suppuration. This probably occurred in a man mentioned by Rochoux.\* After a febrile attack he lost the sight of his left eye, and five years after died of apoplexy. Extensive extravasation was found as the immediate cause of his death. In the left corpus striatum there was a very small cavity, surrounded by a thick and firm sac, and containing a small quantity of a yellow fluid. There was another still smaller in the same situation on the right side. A man, mentioned by Morgagni, had headach, with loss of speech and weakness of the muscles of one side of the neck. He died after some time without any other paralytic symptom, and an abscess was found in the corpus striatum. In many cases in which the speech has been chiefly affected, the disease has been found to be in one of the corpora striata; but in a remarkable case which I have mentioned, which began with loss of speech, and went on to fatal coma, with hemiplegia,

\* Rochoux, *Recherches sur l'Apoplexie*, p. 40.

it was in the upper part of the hemisphere, in contact with the membranes. In a case mentioned by Bonetus, which was fatal by effusion, without any organic disease, one of the first symptoms was inability to raise the eye-balls. Inability to open the eyelids is frequently observed, and also, though less frequently, inability to shut them. In the same manner we meet with loss of particular senses, as sight and hearing; more rarely of smell, and sometimes of taste. A man, mentioned by Portal, was blind after coming out of an apoplectic attack, and recovered his sight after a considerable time. I know a lady who lost her sight completely several years ago, after an attack which was of an apoplectic kind, but very slight and transient.

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#### OF LETHARGY, &c.

The various forms of comatose affections which have been described by systematic writers, are merely varieties in degree, or modifications of the disease, of little practical importance. *Lethargus* is a state of torpor, with loss of memory, without constant sleep. The patient can be roused so as to answer questions, but remembers nothing, and when left to himself generally sleeps. *Cataphora* has more the appearance of constant sleep, but a sleep from which the patient can be roused, though he immediately relapses into it. *Carus* is sleep from which he cannot be roused, the breathing soft and natural. *Apoplexia* is carus, with stertorous breathing, the limbs relaxed; *Catochus* is apoplexia, with convulsive rigidity of the limbs. *Coma vigil*, or *typhomania*, is the state of insensibility without sleep, generally with delirium, which occurs in severe cases of typhus fever. These are in general nothing more than systematic refinements. Some of the conditions here alluded to, however, are deserving of some attention. The state of lethargy presents some interesting phenomena, in regard to the extent in which it may exist without passing into apoplexy, and without permanently injuring the functions of the brain, though they are for the time completely overpowered and suspended. A man mentioned by Mr John Bell, who had been accustomed to a life of much activity, was confined from his usual employments by an extensive fistula, which he had concealed. Being of a full habit, and his appetite unimpaired, he soon sunk into a state of complete lethargy. Nearly his whole time was spent in sleep. When roused he attempted to answer questions, but his answers were incoherent, and his speech inarticulate. He had been a long time in this condition when Mr Bell saw him. His fistula

being cured, he recovered gradually by evacuations, blistering on the head, and a proper regulation of his diet, and in a few weeks was well. He returned to his former employments, and managed with correctness the affairs of a company.\* Hippocrates mentions a priest, subject to annual fits of gout, in whom the paroxysm terminated regularly, for several years, in a state of lethargy, from which he could only be roused to take food or drink. It was accompanied by tremors, stupor, and forgetfulness, immobility of the eyes, and a completely enervated state of the whole body: it generally continued one or two weeks.† A man mentioned by Willis, at the crisis of a putrid fever, lay for four days in a state of profound sleep, from which nothing could rouse him. He then came out of it, after blistering, but his faculties were gone, so that he knew nobody, remembered nothing, and understood nothing, “*vix supra brutum saperet.*” He continued in this state for two months, and then gradually recovered.‡ Some years ago I saw a young man, who, at the end of a tedious fever, fell into such a degree of stupor, that I apprehended effusion in the brain. He recovered, however, after a good many days, and his bodily health was soon restored, but his mind was in a state approaching to idiotism. In this condition he was taken to the country, and recovered gradually after several months. But the most remarkable case of this kind is related in an American periodical work, which I have not now by me, and cannot refer to. The patient was a clergyman, about 30 years of age, a man of learning and acquirements, who, at the termination of a severe illness, I believe a tedious fever, was found to have lost the recollection of every thing, even the names of the most common objects. His health being restored, he began to acquire knowledge exactly as a child does. After learning the names of objects, he was taught to read, and after this began to learn the Latin language. He had made considerable progress, when one day, in reading his lesson with his brother, who was his teacher, he suddenly stopped and put his hand to his head. Being asked why he did so, he replied, “I feel a peculiar sensation in my head, and now it appears to me that I knew all this before.” From that time he rapidly recovered his faculties.

The state of the brain in such cases differs from apoplexy, but it is nearly allied to it, for it sometimes occurs as the prelude to apoplexy, or it may be left as a consequence of it, after

\* Bell's Principles of Surgery, Vol. II. p. 661.

† Hippocrat. Coac.

‡ Willis, de Anima Brutorum, p. 226.

every other symptom has been removed. A gentleman mentioned by Wepfer was seized with hemiplegia of the right side, and profound sleep ; in the second day the right side was convulsed, and after this the palsy disappeared. He lay in a state of sleep for nine days, having, during seven days, refused to take any food. On the eighth he began to take what was offered him, and on the ninth came out of the state of stupor, but his faculties were gone ; he knew nobody, and neither remembered nor attended to any thing. After several weeks, he began to know his most particular friends, then began to remember words, to repeat the Lord's prayer, and to read a few words of Latin, (rather than German, his own language,) but only a few words at a time. If urged to read more, he said that he formerly understood these things, but now did not. He could write, however, and frequently wrote lines, both of German and Latin words, in elegant characters, but without meaning. After some time, he began to pay more attention to what was passing around him, and to look after his household affairs. He often lamented his want of understanding, and expressed his hopes that he would recover it. While thus making slight and gradual progress, he was, after three or four months, cut off by an attack of apoplexy.\*

This condition of the mental faculties, we have seen, is not confined to apoplectic affections, but also occurs in other diseases, especially fevers. A state analogous to it may take place from diseases of simple exhaustion. Many years ago I had under my care a lady, who, from a severe and neglected diarrhoea, was reduced to a state of great weakness, with remarkable failure of her memory. She had lost the recollection of a certain period, about ten or twelve years. She had formerly lived in another city, and the period of which she had lost the recollection, was that during which she had lived in Edinburgh. Her ideas were consistent with each other, but they referred to things as they stood at the period of her removal to Edinburgh, or before it. Her son, for example, who was 13 or 14 years of age, she spoke of as an infant. She recovered her health after a considerable time, but has remained in a state of imbecility, resembling the dotage of old age.

Numerous examples are on record of long-continued sleep. Several cases of it are described in the Memoirs of the Royal Academy of Sciences for 1713. A man in La Charité slept four months : and a Dutchman slept six months : he then awoke,

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\* Wepfer, *Historia Apoplecticorum*, p. 242.

conversed for some time, and fell asleep again. No farther account is given of him.\* Many of these cases, I suspect, have been embellished, and others have originated in imposture.

Allied to this subject is the very interesting topic of *apparent death*, which presents too wide a field to be entered upon at present. Many cases are on record of persons recovering after they had been for some time considered as dead, and even during the celebration of the funeral rites. Many of these have been cases of extreme exhaustion from fevers, especially plague,† and others have been apoplectic cases. Zacutus mentions a man who fell down apoplectic, and, after being considered as dead for 20 hours, was carried out for burial. During the procession, the bearers hearing a noise in the coffin, opened it, and found froth at the mouth of the body. Zacutus being called, found pulsation in the arteries, and the man recovered.‡ A woman who was supposed to have died in a state of coma, connected with hysteria, recovered after Vesalius had made several incisions for the purpose of examining her body; she afterwards died of the wounds.§ A similar circumstance is related of a Spanish physician, who, in opening the body of a nobleman, found his heart palpitating. A lady, sister of the great Duke of Marlborough, after being for some time in bad health, fell down suddenly, apparently dead, and was considered as dead both by her physicians and friends, except her husband, who from some circumstance that had occurred to him, would not allow her to be buried, until he should have indubitable evidence of her death. After lying in this state for seven days, she awoke as from a sleep, and enjoyed good health for many years.||

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#### OUTLINES OF THE TREATMENT OF APOPLEXY.

The facts which I have mentioned in this paper, have an immediate and important reference to the treatment of simple apoplexy. We have seen that the disease may exist in its most violent form for a very considerable time, and yet be fatal, without producing any evident change in the organization of the brain. This occurred in case 6th, which was fatal in twenty-four hours, and in Dr Powel's case, which was not fatal till the third day.

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\* See also Philosophical Transactions, Vol. XXV. p. 2177.

† See Hildani Opera, Cent. II. Obs. 95. Gregorius Horstius, Lib. 7.

‡ Zacuti Praxis Medicin. Admirand. p. 15.

§ Lancisius de Subitaneis Mortibus, Lib. I. Cap. xv.

|| Taylor on the Danger of Premature Interment, p. 43.

Dr Stark mentions a man, aged 31, who lay forty-five hours in perfect apoplexy, and then died, and, on the most careful examination, no morbid appearance could be detected in any part of the brain.\* We have farther seen reason to believe, that those cases which terminate by effusion, and many of those in which we find extravasation of blood, were at the commencement in this state of simple apoplexy. We have seen, finally, that we have no certain mark by which we can ascertain the presence of effusion, but that some cases which have very much that appearance, are fatal without effusion, and that others may be saved by copious blood-letting. All these considerations give the strongest encouragement to treat the disease in the most active and persevering manner; not to be influenced by the hypothetical distinction of apoplexy into sanguineous and serous; not to despair, though we do not see an immediate effect from our remedies; and finally, not to be hasty in concluding that the disease has passed into a state, in which it is no longer the object of active practice.

In the apoplectic attack, our first object is to take off the impulse of blood from the arteries of the head, in the hope that, in the state of collapse thus induced, the vessels may resume their natural relations, and restore the healthy state of the circulation. This is to be done by large and repeated blood-letting, purgatives, and the application of cold to the head, aided by a raised position of the body, cool air, and the absence of all stimuli. Small doses of tartrite of antimony, from its known effect in restraining vascular action, may in some cases be used with advantage as an auxiliary, provided, in the early stages, it do not excite vomiting.

It is evident, that, to produce the intended effect, the bleeding must be such, as powerfully to affect the system, producing weakness of the pulse and paleness, and it should be repeated at short intervals, as soon as these effects begin to subside. Perhaps the first bleeding should be from the arm, from a large orifice, so as to make an impression upon the whole system; but there is an evident advantage in bleeding from the temporal artery, as thereby I think we make a more immediate impression upon the carotid. Perhaps, in an urgent case, the best practice would be to bleed from the arm and the temple at once. Much importance has been attached to bleeding from the jugular vein, as most likely to give immediate relief to the head: but we must recollect, that the only jugular vein that we can open is the external jugular, which brings the blood from the integuments

\* Works of Dr William Stark, p. 73.

of the head, and has no connection with the brain, except by a very small branch coming through the orbit from the cavernous sinus, and another, equally minute, which accompanies the meningæal artery. Bleeding from the jugular vein must therefore be inferior in efficacy to bleeding from the temporal artery. Bleeding, which does not affect the system, such as that from a few leeches, can be considered as little better than a placebo. As soon as possible after the bleeding, means are to be taken for inducing strong purging. For this purpose, the most active purgatives are to be given; if the patient can swallow; if not, strong purgative injections. When purging can be speedily accomplished, the effect is often extremely beneficial. Several cases are mentioned in this paper, in which little effect seemed to be produced by the bleeding, but an evident improvement took place after a full evacuation of the bowels. The powerful application of cold to the head seems to be a remedy of considerable efficacy. It should be applied by a full stream of water directed against the crown of the head, and received in a basin held under the chin, the patient being supported in a sitting posture. In a former paper, I have given an example of a girl restored in a few minutes, or rather seconds, by this remedy, from a state of perfect apoplexy.

The use of these remedies is sometimes followed by an immediate removal of the apoplectic state. In other cases, though little immediate effect may be produced, by a persevering repetition of them, the coma begins to subside after some time, perhaps a good many hours, or even a day or two. But, in some cases, they may be used in the most active manner, so as to reduce the system as far as appears expedient or safe, without diminishing the conia; and after all, we may find upon dissection, that the disease was still in the state of simple apoplexy. This important fact cannot be too often repeated, or too carefully kept in mind, and it should lead us to prosecute the treatment of apoplexy with the greatest attention and perseverance. "It ought to be known, (says Dr Cheyne,) that from six to eight pounds of blood have been taken from a person by no means robust, before the disease, which ended favourably, began to yield." \*

In saying that our practice is not to be influenced by the hypothetical distinction of apoplexy into sanguineous and serous, I by no means intend to maintain, that every apoplectic case is to

\* Cheyne on Comatose Diseases, p. 61.

treated precisely in the same manner. In the extent of our evacuations, a due regard is certainly to be had to the age and constitution of the patient, and to the strength of the pulse; but I think I have ground for saying, that there are no symptoms which characterize a distinct class of apoplectic affections, requiring any important distinction in the treatment; or in other words, a class which, in their nature, do not admit of blood-letting. On this important subject, I think I may refer with some degree of confidence to the facts which I have related in this essay. Weakness of the pulse, and cadaverous paleness of the countenance, I have shewn to be frequent symptoms of sanguineous apoplexy in its most hopeless form. On the other hand, I have given reasons for believing that serous effusion is a termination of simple apoplexy, and that cases may terminate in this manner which are accompanied by strong pulse, and flushing of the countenance. I have described a remarkable case, (case 8th,) in which there existed every circumstance that could lead us to consider the disease as serous apoplexy, but which was fatal without any effusion; and another, (Mr Turner's case,) in which there was extensive effusion, without any apoplectic symptom. Finally, I have given several examples of perfect apoplexy in persons, old, feeble, and withered, who were saved by copious and repeated blood-letting. There may, without doubt, be apoplectic cases that do not admit of blood-letting, but such cases there may also be of pneumonia or enteritis: these do not affect the general question; they are to be determined by the judgment of the practitioner, and it is impossible to lay down any general rules concerning them. The strength of the pulse is a very uncertain guide, for, in several cases that have been mentioned, in which it was at first weak, it improved after blood-letting, and continued of good strength through the further progress of the disease. The comatose affections which I have mentioned, that are connected with an exhausted state of the system, are certainly to be kept in mind as exceptions to these general observations. These, however, are of rare occurrence; they appear chiefly in children, are easily distinguished by attention to the history of the disease, and have no influence on the general question of the treatment of apoplexy.

By bleeding, and other evacuations, we perhaps cannot properly be said to cure apoplexy. We only remove certain obstacles to the cure, which consists in the vessels resuming their healthy action after these obstacles are removed. Now we have every reason to believe, that all may be done which we can do by evacuations, and yet the vessels not recover their action. Having therefore carried these remedies as far as we judge

safe or expedient, our next object is to inquire whether we have any means which may contribute to restore the healthy state of the circulation in the brain. Perhaps blistering may have some effect, and I think I have seen decided benefit from strong friction of the body. But these remedies are not much to be relied on. The use of emetics in apoplexy is a practice to be mentioned with much caution. We have been a good deal in the habit of ascribing it to Dr Fothergill, who used emetics on the principle of apoplexy arising from the stomach. But the practice does not rest upon this untenable hypothesis; it is in fact as old as the days of Aretæus, and has been employed at different times by physicians of the first eminence, among whom may be mentioned Etmuller, Sydenham, Boerhaave, and Lieutaud. It probably, therefore, must have some foundation in observation and experience. On the other hand, no person can doubt, that an emetic given in the early stage of apoplexy, would be a practice of the most dangerous kind, and most likely to convert a case of simple apoplexy into extravasation or effusion. If the remedy, therefore, is ever to be employed in any apoplectic disease, it is probably in that state which led me to these observations,—the state in which the system has been reduced as far as appears safe and expedient, by large and repeated evacuations, and yet the coma has not been removed. In this case, the operation of a mild emetic would probably be free from danger; and it is deserving of inquiry what effect it would have upon the circulation in the brain. The same observations apply to the use of stimulants of various kinds, which we find recommended by some of the older writers. The use of stimulants at an early part of the disease must be decidedly and highly injurious. But perhaps we may make a distinction between the action of stimulants in a vigorous and plethoric state of the system, and their action, when the system has been reduced by large and repeated evacuations. In sudden sinking of the vital powers, which we sometimes meet with in inflammatory disorders, particularly of the bowels, I have frequently given large quantities of wine with the happiest effect, almost immediately after a violent inflammation has been subdued, and I never saw the inflammation renewed by it, nor any bad consequence follow the practice. I imagine there are conditions of apoplexy in which stimulants might be given with safety and advantage, but the practice requires much caution.

The observations which I have now made in regard to apoplexy, apply equally to the earlier stages of paralysis. The older cases of paralysis also open a most interesting field of inquiry. Perhaps we have been too much in the habit of believing that

paralysis of any considerable standing depends upon a fixed and irremediable disease of the brain. Many cases are on record which tend to shake this opinion. We see recent cases of it completely carried off in a few days,—and others recover gradually, so as in a few weeks or months to leave no trace of the disease. In many cases again, in which, after long continued palsy, the patient has died of some other disorder, we find no such fixed disease. In some, we find very little morbid appearance, and in others, only serous effusion in no great quantity. Add to these facts, the singular examples of very sudden recovery, even in cases of long standing. A man mentioned by Dr Russel,\* after an apoplectic attack with hemiplegia, recovered the use of his arm in six weeks, but the lower extremity remained perfectly paralytic. After twelve months, in which he had made no improvement, he was one day astonished to find that he had some degree of motion of the leg, but it continued only a few minutes. On the same evening he had headach, and in the night was seized with a sort of fit, in which the paralytic limb was strongly convulsed. After the fit, he had slight power of moving the limb. The fit returned next day, and again in the night, and then left him completely free from paralysis, and in perfect health. He had continued well for eight years at the time when the account was written. A case considerably similar, though of shorter standing, occurred to a friend of mine. A middle-aged man was suddenly attacked with hemiplegia, and loss of speech, while he was using violent exercise, in walking very quick or running. All the usual practice was employed without any improvement, for a month. The paralytic limbs then became one day suddenly convulsed, and when this subsided, the paralysis was gone. In a woman mentioned by Dr Home,† hemiplegia of considerable standing was cured by an attack of fever.

A man, whose case is described by Mr Squire,‡ had been liable to convulsions from his childhood till he was 25 years of age. The fits then left him, and he enjoyed good health for three years; when, without any previous complaint, except a cold, he suddenly lost his speech. He had no other paralytic symptom, and was otherwise in good health, but continued perfectly speechless for four years. He was in general a man of temperate habits, but having at this time been one evening much

\* London Med. Obs. and Inq. Vol. I. p. 296.

† Clinical Experiments, p. 264.

‡ Philosophical Transactions, Vol. XLV. p. 148.

intoxicated, he fell from his horse three or four times in his return home, and was at last taken into a house on the road, and put to bed. He soon fell asleep, and had a frightful dream, during which, struggling with all his might to call out for help, he did call out, and from that moment recovered his speech perfectly. A young woman, mentioned by Dr Watson,\* had been long liable to severe convulsions, the attacks of which were frequently followed by temporary paralysis of particular muscles, which had been most severely affected, for different parts of the body were affected at different times. After one attack she lost her sight completely for five days. At length, after one of the fits, she lost her speech, and recovered it after a short time; but the convolution returning soon after, was again followed by loss of speech, and she continued perfectly speechless for fourteen months. During this period she had no return of the convolution, and was otherwise in good health. Having one evening violently heated herself, by dancing for four hours, she recovered her speech, and from that time continued free from complaint.

These examples point at a most important principle in regard to the treatment of paralysis; that cases of it, even of long standing, sometimes depend upon a cause which is capable of being removed completely, and removed almost in an instant; and they hold out to us a most interesting subject of research in the treatment of such cases, which, of all diseases, are usually considered as the most hopeless.

After the first urgency of the symptoms has been subdued by the means that are employed in the apoplectic attack, the restoration of the paralytic parts has been attempted by a variety of remedies, chiefly of a stimulating nature, both external and internal. To the former class belong warm-bath, friction, electricity and galvanism, to the latter mustard, ammonia, camphor, and nearly the whole class of stimulants. It is not easy to decide upon the merits of these remedies; but it is certain, that they all require to be used with much caution, as the action by which they have the chance of being useful, is nearly allied to that by which they may renew the apoplectic attack. Perhaps, on a principle to which I have already alluded, the danger from the use of them may be in some measure averted, by keeping the system very low, by spare living and evacuations. This, I imagine, is always to be considered as an essential part of the cure. Paralysis is something very different from debility; and I cannot

agree with some most respectable writers, who hold, that the diet in paralytic cases should be nourishing and restorative. With this precaution constantly in view, I think it probable that there are cases of paralysis in which stimulants may be employed with benefit. I cannot say what remedies of this class are to be preferred. Dr Vaughan has strongly recommended the tincture of cantharides, \* others have employed the balsams and turpentine, mustard, arnica montana, gniacum, seneka, and various others; also several articles of a narcotic quality, as the Rhus toxicodendron. In Germany, phosphorus is said to have been lately given internally with advantage, and in France, the favourite remedy at present is the Nux vomica. † It is given in extract, in doses of gr. ij. three or four times a-day. It is apt to occasion convulsion, and the first proposal of it is said to have been founded on the observation, that when paralytic limbs become convulsed, they frequently soon after recover their power. In the most favourable examples, however, that have been given of its efficacy, a long time was required for the recovery; and as we know that a considerable proportion of paralytic limbs recover spontaneously, we must be very cautious in ascribing recovery to the action of any particular remedy. Emetics have also been strongly recommended, and mercury pushed to smart salivation. Mr Wardrop ‡ has described a singular case of eighteen months standing, which seemed to derive benefit from tickling the parts with a feather: it recovered in two months: and M. Gros mentions a cure by stinging with nettles. § Celsus seems to have employed a similar practice.

The cases of inflammatory paralysis are to be treated upon the same general plan as the more common form of the disease. They ought to be treated with great decision at the commencement, as irremediable mischief may probably be done to the brain at a very early period. The discharge by blistering, issues, and topical bleeding, may perhaps be more beneficial in these than in the apoplectic cases.

Symptoms indicating a tendency to the apoplectic or paralytic state, are to be treated upon the same principles, by evacuations, spare diet, abstinence from stimuli, and from all exertions that quicken the circulation, cold applications to the head,

\* Mem. of the Med. Society of London, Vol. I. p. 360. See also Edin. Med. Journal, Vol. X. p. 419.

† Bulletins de la Faculté de Medicine, 1816, 1817.

‡ Edin. Med. Journal, Vol. VIII. p. 197.

§ Mem. de l'Acad. Roy. de Sciences, 1741.

shower-bath, &c. Frequently we make little impression upon them by regimen, until we have given them a turn by one full bleeding. Dr Cheyne has recommended preparations of antimony as very beneficial in the apoplectic tendency. He employs James's powder, of which he gives a dose every night—he has also found it useful in epilepsy.<sup>\*</sup> Perhaps we pay too little attention to the influence of sleep upon the functions of the brain. I imagine that great abridgment of the quantity of sleep might be found, in affections of the head, a more powerful remedy than we are aware of.

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Dublin Hospital Reports, Vol. I. p. 515.

